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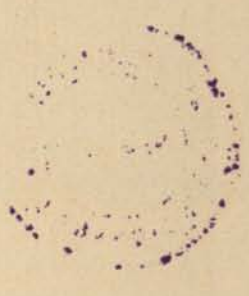

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SOUTHERN TIBET

DISCOVERIES IN FORMER TIMES COMPARED WITH MY OWN RESEARCHES IN 1906—1908

BY

SVEN HEDIN

VOL. III

TRANSHIMALAYA

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ERRATA.

Page	251	line	12	from	below	stands	*Nangtse*	for *Ngangtse*.
»	262	»	12	»	»	»	*Nyen-*	» *Nien-*.
»	323	»	2	»	»	»	*351*	» *371*.

THE CATHOLIC MISSIONARIES

1—141741 *III.*

CHAPTER I.

GRUEBER AND DORVILLE.

It can hardly be said to be a difficult task to write the history of exploration in such a part of Tibet as the Central Transhimalaya, for nobody, except the Chinese explorers and myself has ever penetrated this gigantic mountain system; and, judging from the Chinese maps, one could not tell how far these surveyors have seen the country with their own eyes or obtained their information from natives.

Still, however, there is a good deal of literature on the subject; for a few Europeans and Pundits have crossed the limits of Central Transhimalaya near Tengri-nor and the sources of the Indus; one early expedition (Desideri and Freyre) and two modern (Nain Sing and Rawling-Ryder) have followed the Tsangpo valley, three expeditions have touched the northern boundaries of the region, namely Nain Sing, Littledale and myself (1901), whilst some other explorers have only touched it slightly, as Deasy, Rawling, Bower, and de Rhins. From his route along the northern shores of Ngangtse-tso and Dangra-yum-tso Nain Sing could see and enter on his map some peaks belonging to the system, and so was also the case with Ryder and Wood, whose determination of the height and situation of several peaks gives a frame of immense value to the whole central system. These two, Nain Sing and Ryder, had approached the Transhimalaya nearer than anybody else. But nobody, except, probably, the Chinese surveyors, whose survey was not always accepted on modern European maps, had ever penetrated or crossed the unknown country which was left blank on the latest European maps.

To write the history of geographical investigation in this region will thus be to trace and analyze all the expeditions which have touched its boundaries, further to analyze what can be got from Chinese sources and, finally, to examine and discuss the result at which European speculation has arrived, a matter which now has only the historical interest of a geographical problem.

Grueber and Dorville are the first Europeans who ever crossed the Transhimalayan system. Desideri and Freyre followed almost the whole length of its southern edge. Van de Putte crossed it twice in the eastern part, delle Penna, Beligatti and all the other Capuchin missionaries crossed its southern ranges on

their way to and from Lhasa. Dealing with them in this chapter I will have to touch upon some parts of their itineraries which do not belong to Transhimalaya, but which I thought practical not to exclude from their narratives. This is specially the case with Beligatti's report, which is of very great interest and value and little known.

On their famous journey in 1661 to 1662 the two Jesuit Fathers JOHANNES GRUEBER and ALBERT DORVILLE [1] crossed the Transhimalaya. They left Peking on the 13th of April 1661 and arrived at Agra in March 1662, having passed through Si-ngan, Lan-tchu, Si-ning, along the northern shore of Koko-nor, through Tsaïdam, over Tang-la to Reting and Lhasa, from where they continued *viâ* Shigatse to Katmandu, Patna and Agra. Thus they must have crossed Transhimalaya between Nak-chu and Reting-gompa.[2]

TRONNIER regards Grueber as one of the most successful travellers of the whole of the 17th century, although not he but ODORICO DE PORDENONE, some 330 years earlier, was the first European to cross Eastern Tibet. Odorico, however, has left only a short description of Tibet: *Du royaume de Riboth*,[3] which is on the confines of India. If now, as CORDIER shows, Odorico has travelled from Szechuan to Tibet, say for instance *viâ* Chiamdo, he may have reached Lhasa without crossing the Transhimalaya, for we do not know as yet in what relation this system stands to the mountain ranges between Salwen and Yangtse-chiang.

Odorico's notes are very short and Tronnier is correct in saying that Grueber is at any rate, the first who has brought us a better and more correct knowledge of the country and its inhabitants. All that we know of Grueber's journey is to be found in letters to his friends and some annotations, published by THÉVENOT. According to RICHTHOFEN, KIRCHER compiled his description of Grueber's journey from there.[4] To this Tronnier remarks that Kircher's account is the most authentic in existence, which is clearly proved both by Kircher and Grueber.

In the following I cannot help giving some quotations concerning Grueber from Kircher's remarkable work together with his own geographical deductions.[5] To his second map we will return later. The first is exactly like the one of China, in Thévenot. In the second part of his work Kircher quotes the following passage from MARCO POLO: »Now, if we go on with our journey towards the east-northeast, we travel a good forty days, continually passing over mountains and hills, or

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[1] Richthofen writes d'Orville, Markham Dorville and Tronnier de Dorville.

[2] The best authority on this journey is Richard Tronnier: »Die Durchquerung Tibets seitens der Jesuiten Johannes Grueber und Albert de Dorville im Jahr 1661.» Zeitschrift der Gesellschaft f. Erdkunde z. Berlin 1904, p. 328 et seq. Further in Richthofen: China, I. 671 and Markham: Narratives of the Mission etc. p. LVI and 295 et seq. In Tronnier's article all the literature is quoted.

[3] Les voyages en Asie au XIVe Siècle du bienheureux frère Odoric de Pordenone Religieux de Saint-François, par Henri Cordier, Paris MDCCCXCI, p. 449 et seq.

[4] Richthofen, op. cit. p. 672, Note 3).

[5] La Chine d'Athanase Kirchere de la Compagnie de Jesus, Illustrée de plusieurs Monuments . . . Amsterdam 1670, II: p. 66, 89, 104, 319.

through valleys, and crossing many rivers and tracts of wilderness. And in all this way you find neither habitation of man, nor any green thing, but must carry with you whatever you require. The country is called Bolor.» [1] Kircher has, of course, used another version of Marco Polo, but the difference does not much matter. The point is the extraordinary way in which he explains the situation of Bolor.[2] He says that Marco Polo's description of Bolor does not contain anything that would not agree perfectly with the mountain which »nowadays is called Langur and which is situated in the kingdom of Lhasa». And he adds: »Le Pere Jean Gruberus, qui la visitée & la parcouruë tout à pied raconte que quoiqu'il fit ce voyage au milieu de l'esté il eust peine (estant au plus haut) de pouvoir s'empescher de mourir tant à cause de la subtilité de l'air qui ne permet pas la respiration, que parce qu'il y a une certaine herbe pestilentielle & venimeuse, laquelle evapore une senteur puante . . .» He concludes that Marco Polo »calls that country Belor, in which, a short time ago Thebeth was discovered». On his map (Vol. I, Pl. XI) Belor mons is situated between Tanchut Regn. and Reg. Tibet. Thus his text does not agree with his map, where the distance is considerable between Belor mons and Lassa Reg., in which he says Langur is situated, and Langur should be identical with Marco Polo's Bolor. He gives the following partly correct and partly confused description of the country between Si-ning-fu and Lhasa. They had crossed the »Hoang» twice and reached Si-ning in 30 days from Peking. »Aprés leur despart de Sining ils marcherent pandant trois mois de temps dans le desert de Kalmack de Tartarie, & arriverent au commencement du Royaume de Lassa, que les Tartares appellent Barantola. Ce desert est en partie montagneux, & en partie plain & uny, mais cette differente disposition de lieu ne luy donne pas plus de fertilité dans un endroit que dans un autre, n'y plus de disposition a estre plus abondant en quelques unes de ses parties; puisqu'il est esgallement couvert de sable par tout. Il est vray pourtant qu'on y trouve assés souvent des ruissaux dont les rivages fournissent abondamment de l'herbe, & du pasturage pour toute sorte d'animaux.» He says there are people who believe this desert goes the whole way from the heart of India to the Glacial sea. Marco Polo calls it Lop, the Tartars called it formerly Belgian and now Samo, the Chinese Kalmuk, others Caracathai or the black Cathaie. The only animals that are to be found in it are »des tauraux sauvages», wild yaks. The natives dwell in »maisons portatives» [3] on the banks of the rivers where they find sufficient grazing for the flocks.

The southern part of the country he describes in this way is the Transhimalaya.

Then follows a more detailed description of Langur or l'Angur, a mountain, the horrors of which have impressed other missionaries, Desideri and Beligatti, in the same way.

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[1] Yule: Marco Polo, 3d edition, revised by Henri Cordier London 1903. Vol. I, p. 171.

[2] Regarding Bolor see Yule's erudite article: »Notes about the Bolor» etc. Journal Royal Geogr. Society Vol. XLII 1872, p. 473 et seq.

[3] Here Odorico is more correct: »Les gens de ce pais demeurent en tentes de fuerre (feutre).

»Sortant de Lassa ou Barantola, qui est sous le 29 degré 6 minutes de l'eslevation du Pole, ils arriverent dans quatre jours au pied de la montagne de l'Angur, qui est si eslevée que les personnes qui sont au haut ne peuvent pas y respirer; parce que l'air y est trop subtil, n'y rester long temps; parce qu'en esté il y croit certaines herbes venimeuses, lesquelles exalent une odeur si puanté, & si dangereuse, qu'on ne sçauroit y rester sans denger de perdre la vie, n'y mesme y passer sans courir risque de mourir. Cette montagne est si affreuse & si pleine de roches, & de precipices horribles, que n'y les charriots n'y les chevaux ne sçauroient y passer; desorte qu'il faut faire ce chemin à pied pandant un mois entier, avant que de pouvoir arriver à Cuthi premiere Ville du Royaume de Necbal . . . Je m'imagine que le traject dont parle Ptolomée n'est autre que celui dont je traitte, & que ce lieu qu'il nous propose sous la figure de plusieurs Caucases enchaisnés les uns avec les autres, & dont l'estenduë, & la largeur dépuis son Orient jusques au Midy & dépuis son Midy jusques à son Septentrion (qui est trés grande) n'est autre que celuy que je dis & qu'il appelle Parapanise. Marc Paul Venètien le nomme Belor: & chasque Nation luy donne un nom selon sa fantasie, & comme il luy plait.»

From Grueber's itinerary he calculates 214 days' journey from Peking to Agra, without stopping; but he forgets that the Fathers stayed two months in Barantola. The Fathers, he says, were provided with several mathematical instruments and »une paire de lunettes de forme optique». In spite of this scientific equipment the geography of the Fathers is rather confused, as for instance, when Kircher says: »Quelque temps aprés, ces Peres estant partis de Necbal, arriverent aux confins du Royaume de Maranga, qui est enlassé dans le Royaume de Tebet, duquel la Ville principale s'appelle Radoc qui fut le lieu où le Pere Andrada finit le voyage qu'il avait entrepris dans ces regions orientales . . .»

At the end of this edition of his book Kircher has published the questions put to P. Jean Grubere by the Grand Duke of Toscana, as well as the Father's answers. The fifth question of the Grand Duke is very clever and it is a pity that an explorer with mathematical instruments, could not give a better answer. He asks whether Father Jean has entered the possessions of the great Mogul through Tartary or through Usbek, which are to the north, or whether he did it from the eastern side, and, finally, whether he has any knowledge of the parts of Thebet or Thabut, of which Pater Antonio de Andrade makes mention? And Grueber replies:

»Je responds qu'à suivre la ligne geographique qui prend dépuis la ville de Pekin jusques à la ville de Sinim, qui est dans les murailles de la Chine, j'ay toujours marché vers l'occident, & ne me suis escarté de cette route, en allant vers le midy, que de 4. degrés qui sont deux mois de chemin; de sorte que partant des murailles, j'ay tousjours marché vers le *Sudwest*, que les Italiens appellent Lebest, jusques à ce que je suis parvenu au Royaume de Mogor, aprés avoir passé par tous les Estats qui suivent. 1. Par la Tartarie deserte. 2. Par le Royaume de Barantola. 3. Par celuy de Nepall. 4. Par celuy de Moranga, par où je suis venu aux Indes Orientales au delà du Gange dont la principalle ville assise sur ce mesme fleuve du costé de l'orient, est Minapor, . . . Pour ce qui est de Usquiens, je les ay laissés tant du costé du Septentrion que de l'Occident. Pour le regard du Royaume de Thebet, j'en ay une assés parfaite connoissance; parceque nos PP. aussi bien que les Chrestiens qui y ont esté, m'en ont parfaitement informé. Je dis donc 1. que le Royaume de Srinagar, dont la metropolitaine porte le mesme nom, est au delà d'Agra qui est la capitalle de l'Inde, au deça du Gange en allant

vers le Septentrion, parmi les montagnes de Caucase, l'espace de 14 jours de chemin. 2. de plus qu'on trouve vers le Septentrion la region de Chaparang qui obeït à un petit Prince. 3. On vient ensuite, apres 10 jours de chemin dans le païs de Lotoch, en declinant un peu vers le Grec-levant, dans le Royaume de Aratach qui joint à celuy de Barantola, dont nous avons desja parlé, où nostre Societé a par tout des Missions & des residences. Ces quatre regions que le Pere Andrada a parcourües, sont appellées proprement d'un mesme nom; sçavoir de celuy de Thebet. On trouve au delà de ces mesmes regions les Tartares nommés Gor ou Karahithai, c'est à dire Chevelus, lesquels habitent dans des tentes noires, à l'exemple des Zingarés.»

Answering the 8th question, how long the journey took him, he says:

»Je responds que je sortis hors des murailles de la Chine pour entrer dans la Tartarie deserte, le 13 de Juillet l'an 1661: je dis encore que je l'ay toute traversée jusques au Royaume de Barantola, & que j'arrivay aux lieux habités & au sejour Royal le 8 Octobre de la mesme année. J'advouë de plus qu'aprés un mois & demy de chemin, je vins à travers de plusieurs montagnes dans le Royaume de Neppall & j'entray dans la ville Royalle de Cadmendu, . . .»

The 10th, very important question runs as follows: »Sçavoir si le Pere Jean descrira les Provinces & les Estats qui sont hors de la Chine, & s'il en donnera au public des cartes Geographiques»:

»Je responds que le P. Athanase Kirchere a mis dans sa Chine illustrée par les Peres de la Societé de Jesus, la route que j'ay tenuë avec l'histoire qui est necessaire pour ce sujet, ainsi comme le mesme Pere Athanase Kirchere m'a assuré de l'avoir inseré dans son Livre, je croirois de prendre une peine inutile de vouloir adjouster quelque chose à ce qu'un si grand homme en a dit, & de faire un livre à part aprés luy avoir communiqué tout ce que j'en sçay; ainsi je m'en remets entierement à ce qu'il en a escrit dans mesme Livre de la Chine illustrée.»

However, he declares himself willing, if the Grand Duke should wish to put any other questions, to answer them to the best of his power. He has said that he has a nearly perfect knowledge of Tibet. And then that all he knows has been published by Kircher in his *China Illustrata*. One gets the impression that it would have been some kind of insubordination, not in accordance with the rules of the society, if he had written a special book on his journey. If the meagre description of Tibet, contained in Kircher's book, has prevented Grueber himself describing his journey in the same way as, later on, Desideri and Beligatti, it is a pity that he was not left alone with his annotations and with the observations he had made by help of his instruments. For it is hardly possible that he should have nothing else to reply to the Grand Duke's questions.

On Kircher's map[1] we find the route of the missionaries: »Iter P. Francisci Dorvil et Gruberi ex China in Mogul». As compared with other itineraries on the same map it is tolerable. We have seen[2] that the Montes Tebetici must be the Himalayas, in spite of the Kailas belonging to them. These mountains are also

[1] Vol. I, Pl. XI.
[2] Above, Vol. I, p. 167.

crossed by Andrade's route to the lakes and Rudok. It is disappointing to find Reg. Cabul north of the Kailas. But north of Montes Tebetici is Tibet Reg. North of Lassa is Tanchut Regn., and north of Tibet is Regn. Cascar. But the towns of Eastern Turkestan have to be sought for in quite different parts of Asia. Not the slightest attempt to reconcile the routes of different travellers has been made. On Marco Polo's route we find Cotam, Peim, Ciartiam (Cherchen), Desertum Lop (infestum diabolicis illusionibus), Camul, etc., and on BENEDICT GOËS' route, a long way south of Marco Polo's, we read Hiarchan (Yarkand), Acsu, Turphan etc., and between these two routes there is a tremendous system of mountains called Caucasus mons. In the text he says that the Langur of Grueber must be the same mountains as Ptolemy's Caucasus and Parapanisus. But as these are the Himalayas and their western continuation, the Caucasus of the map, occupying the place of Kwen-lun, is the same as the system which he calls Montes Tebetici. Of the Himalaya system he thus seems to have made two different systems, between which Tibet and Cascar have been placed.

There is another proof that the Montes Tebetici are really meant to be the Himalayas and that is the situation of Lassa at their northern foot. From Lassa the route of Grueber and Dorville crosses the Montes Tebetici and the Langur mons before reaching Cadmendu, so it is difficult to understand how he could say in his text that Langur was the same as Caucasus. On the map they are as far apart as Peking and Macao. Lassa Reg. is south of the Montes Tebetici. The route of the missionaries, from Cadmendu to Hedonda,[1] Mutgari and Battana,[2] crosses between the two last mentioned cities a big river which is difficult to identify. No conclusions can be drawn from the names. As the mysterious Lake Kia is missing on this map, the river might be supposed to have taken the place of the western river issuing from that lake and to be the Brahmaputra. But, on the other hand, it is situated south-west of Nepal, and thus ought to represent one of the tributaries of the Ganges. The two great mountain systems do not help us very far. For, if Caucasus mons is meant to be Himalaya, the river rises on the southern slope of the Himalaya and is a Gangetic tributary. If Montes Tebetici represent the only Himalaya of the map, then the river pierces the Himalaya and is the Brahmaputra, which seems the more likely as a city, Bengala, is situated near its mouth in the Gulf of Bengal. The river has thus not the same delta with the Ganges, which does not interfere, as the Jumna also reaches the sea without joining the Ganges.

If Grueber had really nothing more to tell about his journey from the Great Wall to Lhasa, one understands how this distance has become so short on the map. Tronnier has traced the route to be approximately the same as HUC's and

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[1] Etonda on Remell's map; Hettowra of Kirkpatrik?
[2] Patna.

GABET's. He compares[1] the following three sources: Grueber's second letter, Kircher in *China Illustrata*, and a work published in 1697 by JACOPO CARLIERI in Florence under the title: *Notizie varie dell'Imperio della China*. The latter contains more details and Tronnier is correct in asking why these details were not originally communicated by Grueber in his letters. It runs as follows:

»Esséndo egli di China entrato nelle arene della Tartaria deserta, e quella attraversata, in tre giorni, arrivata alla spiagge di Kokonor. Questo è un mare simile al Caspio, di done hà l'origine il fiume Giallo di China . . . Kokonor dunque significa in lingua Tartara Mar grande, dalle rive del quale successivamente discostandosi il Padre, entrò in terra Toktokai . . . Per questa terra passa il fiume Toktokai, da cui prende il nome; bellissimo fiume e sull' andare del Danubio, se non che ha pochissimo fondo, e un' uomo a cavallo lo passa francamente a quado . . . Quindi inoltratosi nel paese di Tangut arrivò in Retink, provincia assai popolata del Regno di Barantola, e finalmente Regno detto propriamente Barantola . . .»

His statement that the Hwangho should originate from Koko-nor reminds us of the Manasarovar as the source of important rivers. Tronnier identifies the river Toktokai with the Murussu. Of special interest is the notice that they passed through Reting-gompa, a great temple half-way between Lhasa and the Nien-chen-tang-la range. It is situated on the great road of the Mongolian pilgrims. Several roads from the north meet at the important place Nak-chu[2]. So whatever road the two missionaries may have taken, they must have passed through Nak-chu. And between Nak-chu and Reting they have crossed the eastern continuation of the Nien-chen-tang-la, which, in these parts, is the highest and water-parting range belonging to the Transhimalayan system. Only from what we positively know nowadays can such an assertion be made, for in Grueber's letters there is nothing about it, nor about any other of the high ranges in eastern Tibet.

By some speculation it would be easy to prove that the mountain range on Kircher's map, beginning at »Origo Gangis et Indi» and stretching to Lassa were nothing else than the Transhimalaya. For the peak with the sources of the Ganges and the Indus must obviously be the Kailas, which belongs to Transhimalaya. So does Lassa itself. But Langur mons, situated further south, is identical with the Himalaya as is easy to understand from Desideri and Beligatti. However, such speculation should be of no consequence in so far as the unreliability of the map is concerned, together with the fact that the texts do not mention a word of any such mountains in Tangut, Retink or Barantola.

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[1] Zeitschrift der Gesellschaft für Erdkunde zu Berlin, 1904, p. 342.
[2] It was the Governor of this place who stopped me in 1901.

CHAPTER II.

DESIDERI.

The brave IPPOLITO DESIDERI is the first European who has followed the southern foot of almost the whole Transhimalaya. There is a lapse of 190 years before the next came, namely, the members of Rawling's and Ryder's expedition. Desideri knows Kailas which has especially fascinated his attention. He mentions the mountains round Lhasa and the mountains north of Sera. He makes special mention of his observations and experiences on mount Langur. Speaking of the cold, frost and snow of Tibet he says it does not depend on the latitude, but partly on the subtility of the air, as the country is surrounded by continuous mountains on all sides, and partly on the winds which have passed over high mountains. The greatest cold, he says, prevails from the middle of October to the middle of April, but on the mountains the snow is more abundant than in the inhabited parts of the country and remains longer. He knows the roads from Lhasa to the north, which cross the eastern Transhimalaya and he has a very clear idea of the general extension of Tibet. In spite of all this he never speaks definitively of the mountains north of the Tsangpo between Kailas and Lhasa. From time to time, as in the above cases concerning the climate, he speaks of the mountains. But he never says, for instance, that north of his road he had mountains the whole way from lago di Retoa to Lhasa, or anything of the same kind.

Still, however, this silence is easy to understand. Following the high road in the valley of the Tsangpo, the mountains to the north have not impressed him; nor did the southern mountains until he crossed them and saw them from close quarters. But as he never had an opportunity to cross the northern mountains, he had no impression, no personal experience of them. From the road along the Tsangpo some peaks may be seen to the north, situated very near the great valley. But one has to cross them in order to get an idea of their morphology, their general orographical structure, their height and extension.

Speaking of his own journey Desideri tells us that he travelled a whole month from the region where he found the first population to Lhasa.[1] Then he shows

[1] Il Tibet, secondo la relazione del viaggio del P. Ippolito Desideri (1715—1721), published by Carlo Puini, Rome 1904, p. 25 et seq.

that he knows two different roads from Lhasa to Sining, although, of course, he is partly wrong in what he says of the population. If his notice of these roads were more detailed, it would enable us to identify the most interesting section of Grueber's and Dorville's route. For Desideri says: »da Lhasà, capitale del principal Thibet, fino a Sinim o sia Si lingh, dove finisce questo Thibet e comincia la Cina, andando per luoghi popolati, è di quattro mesi. E infatti molto mercanti, per far meglio il viaggio, in luogo di andare per luoghi popolati, vanno per l'altro deserto di tre mesi, che da Lhasà conduce a Silingh. Di tal secondo deserto di tre mesi, e del viaggio fatto in esso da due padri della Compagnia di Gesù, ne fa menzione il P. Atanasio Kircher nella sua Cina illustrata.» This points to the eastern road, and as Grueber himself does not mention the mountains he had to traverse, one could not expect that Desideri should do so. He only says that one can ride on horse-back the whole way.

Giving the boundaries of Tibet he says:[1] »a Nord-est e a est confina con la Cina, e con la Bassa Tartaria. A settentrione confina con luoghi aspri e deserti che sono il cammino che conduce all'alta Tartaria indipendente, e al regno di Yarkand.» This is perfectly true, and in the hard and desolate places he talks of, there are the great mountain ranges, one of which is Transhimalaya.

Again, having said that Jegaçê is the capital of the Kingdom of Zang, he continues: »L'altro regno si chiamava Uù, la cui città principale era Lhasà, e comprendeva le provincie poste nel mezzo di questo Thibet. Un altro regno si chiamava Hor; comprendeva alcune provincie situate a nord, e il deserto di nord-est, che e cammino per andare alla Cina.»

So late as in 1879 when the second edition of MARKHAM's book was published, we find, on SAUNDERS' map, accompanying it, in the very heart of Tibet, and just north of Nain Sing's route from Leh to Lhasa, the words: *Hor Pa, Turkish Tribes.* Nay, even on the very last edition of the Royal Geographical Society's map of Tibet, we read, north of Tong-tso and Tashi-bup-tso: *Hor Province,* — a monstrosity that ought to disappear from all maps. When Desideri talks of Hor he does not know that it is practically the same as the »independent High Tartaria». For the Tibetans call the Turks Hor or Horpa and the Mongolians Sok or Sokpa. There are no Turks until you come to the northern side of the Kwen-lun-mountains. But in spite of almost all modern maps, there is not a single Turk in the heart of the Tibetan plateau-land. And there is nobody else either, for the part of Tibet which is generally called Hor on our maps is not inhabited. To Desideri Hor was a kingdom including some provinces situated in the north. But we know better nowadays.

In the following extremely interesting passage he returns to the countries north of Tibet proper and shows how clear his idea was of the general extension and situation of Tibet:[2]

[1] Op. cit., p. 35.
[2] Op. cit., p. 37.

»Se si consideri l'estensione di questo Terzo Thibet, da' primi suoi confini dalla banda di ovest, fino agli ultimi suoi confini per la banda dell'est, cioè da Cartoa sin quasi a Sining, è talmente vasto che sono necessari più di sei mesi di buono e continuo viaggio, per scorrerlo dall'uno fino all 'altro dei due estremi. — Se poi si consideri la di lui estensione da nord a sud, non è questa per ogni banda la stessa, ma molto e molto di suguale. Cominciando ad entrare nella provincia di Zang-tò, che è lo spazio di due mesi e mezzo di cammino, questa parte s'inoltra molto a nord, va a confinare con le scabrose rupi, che riescono al regno di Yarkand, e con le montagne da chi che sia impraticabili, che fanno argine dell'alta Tartaria indipendente, o vogliam dire dei Giongari, e per la banda di sud confina col regno di Collaor, e con altri paesi perpendicolarmente superiori a Sirenagar, li quali tutti sono totalmente fuori degli ultimi confini che abbia l'impero del Mogol, dalla banda di nord . . .»

The difficult and impracticable mountains and rocks he speaks of here cannot be any other than the Kwen-lun-mountains, which indeed rise like a wall or a dam towards Yarkand and high Tartary. Yarkand and Eastern Turkestan were, however, not independent in those days; they were under the dominion of the powerful Dsungar Khan, as Desideri also points out. Otherwise one could suggest that he meant not only Kwen-lun, but all the mountains between Tsang and Yarkand, including Transhimalaya. For at another place he says:

»La città di Lhasà è posta a 29 gradi e 6 minuti d'elevazione di polo; in tal luogo, e ne' luoghi circonvicini, il regno di questo Thibet poco più, e non molto considerevolmente s'inoltra verso nord . . . Da Lhasà fino a Sining, cioè fino alla Cina e la bassa Tartaria, che è lo spazio di tre mesi di viaggio, torna di nuovo a inoltrarsi e sollevarsi verso nord . . .»

I have quoted above[1] his impression of the country round the sacred lake and mountains, but such jewels of ancient original geographical description should not be spoilt by translation. His own words run as follows:[2]

»Passata la metà d'ottobre partimmo da Cartoa, e a' 9 del mese di novembre, arivammo al più alto de 'luoghi, che abbiamo passati in tutto questo nostro viaggio, e al più alto de' monti, che s'incontrino nel passaggio di questo deserto . . . Quivi a Ngnari Giongar vi è un monte sterminatamente alto, molto largo di circuito, nella sommità ricoperto dalle nuvole e da perpetue nevi e ghiacci, e nel resto molto orrido, scabroso e rigido per l'acerbissimo freddo, che vi fa.»

Thus Desideri is the first European who ever visited Kailas and it may be that he also wandered round it, for he speaks of the pilgrims' wanderings and its religious object. This is the only mention he makes of western Transhimalaya.

Regarding the eastern part of the same system we have the following statement concerning the situation of Lhasa: »E' situata nel mezzo di una gran pianura, la quale è circondata da alte montagne . . .» These mountains belong to Transhimalaya. Of Sera he says: »A nord della città di Lhasà, e bastantemente distante da essa, nella medesima campagna, alle radici delle montagne, che per quella banda la circondano, v'è un antico grandissimo convento d'università chiamato Serà.» Thus

[1] Vol. I, p. 269 et seq.
[2] Op. cit., p. 44.

Sera is at the southern foot of a mountain range. But the next passage is more important:[1]

»Nell'altra montagna, sulla sommità di essa, che è a est del convento di Serà, vi è un convento di religiose. Tra la montagna, alle cui radici sta situato il convento di Serà, e l'altra montagna, sopra cui è il detto convento di monache, vi è uno stretto cammino, che va verso nord, e mena nel deserto dell'est, che guida alla Cina. Tale imboccatura è molto facile a difendersi contre qualunque esercito di nemici, che da quella banda vengano contro Lhasà; e con poco presidio, che quivi pongasi può essere inespugnabile.»

This narrow road which goes to the north and through the eastern desert to China, crosses the mountains north of Sera, a part of Transhimalaya. And finally he says:

»Uscendo dalla pianura di Lhasà per la banda di nord, per l'imboccatura che ho detto, che sta vicina al convento di Serà, s'entra nel gran deserto dell'est, che si stende per lo spazio di tre mesi di cammino, al termine, de'quali riesce a Sining, primo luogo della Cina, e posto in fine delle di lei famose muraglie. Il P. Atanasio Kircher tratta bastantemente di questo cammino, e suo viaggio, nella 'Cina illustrata' al cap. 3.°, § II; perciò altro non aggiungo.»

Here too he speaks of the great desert of northern Tibet, without mentioning the innumerable mountain ranges with which it is filled. And he shows the same reverence to Kircher as Grueber did. Grueber's respect may have been understood. But when Desideri began his journey in Tibet Kircher had been dead 35 years and his memory would not have suffered if Desideri had added some new particulars to the meagre description of the road to Sining as given in *China Illustrata.*

If everything is taken into consideration we must arrive at the conclusion that Desideri's narrative hardly contains anything which proves the existence of a mighty mountain system north of the Tsangpo. Did we not know the geography of these parts comparatively as well as we do now, Desideri's description would hardly help us to suspect the existence of such a system as the Transhimalaya. One would rather imagine a plateau-land, partly inhabited by Turkish tribes, partly a complete desert. On its southern edge one would imagine, in the west, a very high but somewhat lonely mountain, unless one suspected that the Father noticed it and paid it special attention only on account of its religious importance. In the east one would understand that Lhasa was bordered by high ranges in the north. But for the distance between Kailas and Lhasa one would not get any idea of the mountains.

And still Desideri's Tibetan geography remains for ever a classic work. It is the first reliable description of Tibet ever given by a European. In topographical detail the Lama surveyors who worked at the same time gave much more. But compare Desideri's general morphology, extension and climate of Tibet with the theories of some modern geographers of Rawlinson's time, and you will not hesitate a second as to whom the first prize is due.

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[1] Op. cit., p. 66.

In the chapter *Partenza della Missione dal terzo e principal Tibet*[1] Desideri says that on this journey one has to pass over a very high and trying mountain called Langur; »which has such a quality that everybody who passes over it, will absolutely feel a great discomfort, specially great pains in the head and shortness of breath and difficulty of respiration, to all of which also comes the fever». Although he passed at the end of May he had heaps of snow and a killing wind and cold. »As it is impossible to ascend and descend the whole mount Langur in one day, there is a great house, in which passengers may rest for cover and protection.» But many travellers, from difficulty of respiration, are not able to stay in this house, and prefer to sleep in the open air. Remembering the curious explanation Father Huc gave of the mountain sickness, it is interesting to read Desideri's views 125 years earlier. Huc says: »on éprouve un malaise tout-à-fait semblable au mal de mer». Some of his party rested at a place where »les vapeurs pestilentielles étaient, disait-on, moins épaisses; le reste, par prudence aussi, épuisa tous ses efforts pour arriver jusqu'au bout, et ne pas mourir asphyxié au milieu de cet air chargé d'acide carbonique . . . La présence de l'acide carbonique était cause qu'il était très-difficile d'allumer le feu . . .»[2] This was on the heights of Burkhan-Budda. Desideri has the following simple and sensible explanation: »Many people suppose that such inconveniences are due to vapours from certain minerals that are to be found in the interior of Langûr; but as no positive sign of such minerals has been obtained up to date, I would rather believe that such effects come from the great acuteness and subtility of the air. I am still more induced to believe so by the fact that I experienced a more painful discomfort on the forthcoming of the wind, and that on the summit of Langûr I positively suffered from deathlike shortness of breath. And even more I do believe so seeing many people suffering more from shortness of breath when inside the large house, where the air is still more subtilized by the action of the fire, made to alleviate cold and for cooking, than when they sleep in the open air. If that inconvenience were caused by mineral or pestilential vapours from the earth, the effect should be quite opposite.»[3]

Such particulars as this in a narrative may serve to prove that the author is a sharp and conscientious observer. Adding to this the extremely clever chapters he has written on *Usi, costumi e Governo civile*, especially in Lhasa, it is no exaggeration to say that many of the modern explorers in Tibet may not at all be compared with Ippolito Desideri, who visited the country nearly 200 years ago.

[1] Op. cit. p. 82.
[2] Souvenirs d'un voyage etc. Paris 1853. Tome II, p. 210.
[3] Op. cit. p. 83.

CHAPTER III.

BELIGATTI.

To give the history of the Capuchin Mission in Tibet does not belong to the object of this work.[1] We have only to analyze, to the best of our power, the geography as found in the different reports. As a good many missionaries visited Lhasa, there ought to exist a real literature on Tibet, but in reality the reports are few and meagre. The most important is GEORGI's *Alphabetum Tibetanum*, which was compiled chiefly on material furnished by della Penna and Beligatti. There can be no doubt that hitherto unknown manuscripts may be buried somewhere in Italian archives, and will have to be discovered in the future.

In the present chapter I will insert a short extract from the important narration of Beligatti's journey in company with della Penna, which was found in Biblioteca Communale Mozzi-Borgetti di Macerata and has the following title:[2] *Giornale di Fra Cassiano da Macerata nella Marca di Ancona Missionario apostolico Cappucino nel Tibet, e Regni adiacenti dalla sua partenza da Macerata seguita gli 17 Agosto 1738 sino al suo ritorno nel 1756 diviso in due libri. Libro primo.*[3]

This first volume is a manuscript of 203 pages *in octavo* with illustrations and a map of Nepal, including the three cities of Katmandu, Batgao and Patan. It is a pity that the *Relazione* has been published without map and illustrations. The volume deals with the journey of the author and his company to Lhasa, and also with the customs and habits of the inhabitants and some religious festivals. The second volume is lost. It probably contained a general description of the country and its inhabitants and of the persecutions through which the missionaries were forced

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[1] For particulars: Ritter: Erdkunde von Asien, Band II, p. 457 et seq., C. Puini: Il Tibet etc. p. XLIX et seq., Adrien Launay: Histoire de la Mission du Thibet, Tome I, p. 31 et seq., Graham Sandberg: The Exploration of Tibet, p. 31 et seq., and, the best of all: Sylvain Lévi, Le Népal, Vol. I, p. 98 et seq.

[2] Relazione inedita di un viaggio al Tibet del Padre Cassiano Beligatti da Macerata (prima metà del secolo XVIII) per Alberto Magnaghi, Firenze 1902.

[3] An extract is to be found in Sir Thomas Holdich: »Tibet the Mysterious», p. 80—85, which is taken from Graham Sandberg: »The Exploration of Tibet», p. 62—83.

to leave Tibet. MAGNAGHI who has tried in vain to find this second volume, supposes that it was lost together with several other manuscripts in the fire which the French put to the convent of the Capuchins of Macerata in 1799. He shows the considerable geographical value of Beligatti's report and regrets that Georgi, instead of quoting the original texts of the missionaries directly from them, has disfigured his sources and changed his materials into a system of his own.

BELIGATTI was born in Macerata 1708 and became a monk in 1725. In 1738 he went to the Mission in Tibet where he stayed for 2 years. From there he went to Nepal and Bengal and returned to Italy in 1756. He died in Macerata in 1785.

From 1703 the Congregazione di Propaganda Fide had conferred the mission in Tibet upon the Capuchins of Marca Ancona. Six monks were elected and started under the guidance of P. FRANCESCO MARIA DA CAMERINO. Only two of them arrived in Lhasa 1708, P. GIUSEPPE DA ASCOLI and FR. MARIA DA TOURS. They were well received but returned in 1712 to Patna. In 1715 the Fathers DOMENICO DA FANO, ORAZIO DELLA PENNA, and GIOV. FRANCESCO DA FOSSOMBRONE returned to Tibet about the same time as the Jesuits DESIDERI and FREYRE came from Ladak. The following year the war in Tibet began and, a short time afterwards, the long and tedious quarrels between the Jesuits and Capuchins. The Mission, however, remained in the hands of the Capuchins, but as it was reduced to only three members della Penna, towards the end of 1736, went to Rome to ask for a new reinforcement of the Mission, or to obtain the permission to send the two Fathers left in India to Tibet. Cardinal Belluga took a great deal of interest in the wishes of della Penna, a special congress of the Propaganda was held in 1738, where it was decided to continue with the mission in Tibet. Twelve Capuchins were sent under the direction of della Penna and with an annual grant of 1 000 Roman scudi, as Belligatti tells us in his manuscript.

Provided with all they could need the missionaries started and arrived, after a long and difficult journey, in Lhasa in January 1741. They were well received, especially by the king, and as soon as they had learnt the language of the country they began to preach, although without success. Intrigues and suspicions arose against the Fathers. Three of them, amongst whom was Beligatti, returned to Nepal in August 1742. The others remained some time in Lhasa. Finally they left Tibet in April 1745 and after two months arrived in Patan in Nepal. A short time afterwards della Penna died at Patan in 1745. Their house in Lhasa was destroyed and one century was to pass before the next missionaries, Huc and Gabet, arrived in Lhasa.

Magnaghi has subdivided Beligatti's diary into three parts: 1) From the start to Kuti on the Tibetan frontier, 2) From Kuti to Lhasa, and 3) Their work and observations in Lhasa.

The missionary went to Paris on foot and sailed from Lorient to Chandernagor, where, after 6 months 18 days all the missionaries met, and continued to Patna. He gives some very clever and interesting descriptions of what he saw on the Ganges. The arrival at Patna took place on December 16th, 1739. They prepared themselves for the long journey and continued over Gandak. Most of the following villages he mentions are impossible to identify. They were now only 8 missionaries, as the rest had stayed behind for some time in Patna. They had 16 native servants and the whole party went on foot. Travelling through the Terai they entered Nepal and arrived on February 6th, 1740, in Batgao, where the Capuchins had a hospice. *Viâ* Katmandu and Nesti they arrived, October 17, in Kuti on the Tibetan frontier and situated on the river Nohotha or Bhotia-Kosi. Here begins the most interesting part of the journey, which Beligatti describes very carefully day by day. Magnaghi here gives the author's own words and his original spelling of the names. And here, or rather a little further on, we begin to look out for some glimpses of the mountains north of the Tsangpo.

On November 10 the journey began. After a burough called Tankialing they reached Yalap, where all travellers had to provide themselves with riding animals for crossing the mountains of Lhangur, »which is almost impossible to pass on foot on account of the strange effects it has, not only on men but also on animals, whether it depends on the rarefaction of the air, or on some nuicible exhalation».

They started, however, with only three riding animals, which were mounted by the most suffering members of the party. In a fort called Tulon (Douloung) they took a rest and then began slowly to ascend the mountain of Lhangur, between precipitous rocks.[1] The nearer they approached the summit of Lhangur the more they felt pains in the head and stomach, and difficulty of respiration, and after 7 *kos'* journey they arrived at a house near the foot of the mountain, called Pambù, built especially for the comfort of travellers.

In this house the whole company rested together with servants and animals and people returning from Lhasa. The night was like a purgatory or inferno. All were complaining, some were shouting brutally, others vomiting, and some delirious. The animals did not improve the miserable situation. The sufferings of the night were so much the more difficult, as they had not been able to eat in the evening.

After sunrise they continued to ascend the mountain. Finally they reached the summit, a plain which sloped very gradually to the other side. They descended »between East and North» and by and by the pains in head and stomach ceased. On the other side they reached a place called Gninsè. At Tingri they did not feel any more of their inconveniences.

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[1] In a note Magnaghi points out that Lhangur or Langur is simply a generic word.

Beligatti cannot understand these curious effects which this mountain causes both to men and animals. Some thought it was on account of the considerable elevation, which forces people to respire rarified air. He also mentions the opposite direction in which the rivers flow on both sides of Lhangur: from east to west on the southern side, from west to east on the other. But he adds: »Notwithstanding the diversity in the course of the water, I should not be able to adhere to the opinion that the mountain Lhangur was the highest mountain — I will not say of Tibet, but of those very mountains which we have had to cross.»

»From Mount Lhangur all the way to Lhasa one is always ascending more than descending, and before one arrives in Lhasa one has to cross Mount Kambalà, which in my opinion and that of others is not unconsiderably higher than Mount Lhangur, and still, on the Kambalà one does not feel any other inconvenience than that which is characteristic to every somewhat uncomfortable ascent.»

Other people believed that the said effects were due to exhalations or minerals or venomous plants on the mountain. After some speculation on the plants, he comes to the conclusion that the symptoms are rather to be accounted for from the exhalations than from the rarefaction of the air. He was confirmed in this view when he, PP. FLORIANO and COSTATINO in 1742 again travelled this way and passed without feeling the least inconvenience, which he thinks depended on the fact that the whole mountain was now covered with snow which certainly hindered the exhalation, but could not diminish the rarefaction of the air. But he wisely says he leaves to naturalists the discussion about the matter, and goes on with his narrative.

They arrived in the valley of Tingri which is one of the finest he has seen in Tibet. There is a river flowing from west to east. In a place Tingri Culà they tried to get animals of burden and for riding. After several days they succeeded in hiring some animals from a Tibetan merchant who was on his way to Lhasa. He gives a very good description of Tingri, its nature, its flocks. On December 3, after a long delay and great difficulties with the muleteers they started for Tingri Saurà. Thence they proceeded to the north-east and halted on the bank of a little brook, where they passed the night under a tent. Beligatti gives, like Desideri, an excellent description of the daily routine of travelling and how they passed their days. Next march the road sloped to the east and beyond Tzogor they halted again on the bank of the brook. The following morning they continued to the east, passing the places Ngambà, Mermbù and Hahar and after 7 *kos*' journey again halted at the same brook as before and experienced during the night the usual cold.

The next day's march took them along the brook and after 4 *kos* they halted at its bank. The 8th they continued further along the brook and after 1 *kos* they passed a fortress situated on the other side of the brook and called Segar-giun (Shikar-dsong). The river grew larger as they proceeded, and on its banks they

saw several small bouroughs and houses, and, on the slopes of the mountains several monasteries and monks. After 4 *kos'* journey they passed the brook on a bridge, saw some other castles and, after 9 *kos'* arrived in a place called Tzuengà[1] where they stayed for the night. Here the river is rather large and is called Bontsu-tsambo.[2]

The 9th they rested. Three roads go from here to Lhasa. One further to the north, another going to Gigazè, »where the second Lhama of Tibet is residing», and the third which is more easterly and takes you to Kianzè. They decided not to take the northern road, but one of the two others and the Kianzè road was chosen. After having provided themselves with necessary provisions they started again on the 10th with a guide, as the muleteers had excused themselves on account of not knowing the road. They went 3 *kos* to the north-east.

On the 11th they left the river on their left hand, reached an open valley and after a very fatiguing journey of 5 *kos* they found a little river, Bontzutsambo,[3] where they pitched their tents. He describes this valley and its winds, or rather storms, and the rain of small stones the wind carries with it. Here he saw two flocks of »wild horses», 19 and 12 resp. The next year the missionaries saw a wild horse which had been given to the Grand Lama in Lhasa.

In the evening there was such a strong wind that they could not prepare their food and only took tea. The 12th and 13th they crossed the river and entered the valley of Cibulun (Chib-lung), where castles and monasteries were found. The principal places here were Tetzin, Thedin and, after 9 *kos*, Kenga, where they passed the night.

The 14th they continued through the valley, where again castles and monasteries were seen, passed »il castello Sungang»,[4] where the governor of the valley resides, which is under the dominion of the Lhama of Gigazè, and at the foot of a little mountain they stopped to pass the night after 4 *kos* journey.

The 15th they crossed the mountain and soon afterwards entered another broad valley, in which they travelled to the north-east »as during the last days», and after 4 *kos'* journey they halted in a poor little place, outside of which they pitched their tent. Next day they continued again through the same valley, which was now almost uninhabited, and passed, after 9 *kos*, a very cold night in their tent.

The 17th they descended a little to the north and travelled over some snow-covered mountains in one of which a spring of hot water was gushing out, so that it could be seen from far away by the thick vapour rising from it. Camped after some 4 *kos*.

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[1] From here, says the editor, he cannot identify Beligatti's route, as the missionaries did not follow the road to Shigatse, but another further south, going to Gyangtse.

[2] Magnaghi says this is the river Phungtu of Stieler and Poùmtsouk-Zzango-tsiou of Klaproth. It goes from west to east and joins the Arun. It is the Poncio on van de Putte's map (Vol. II, Pl. XX).

[3] Obviously the same as before.

[4] Which the editor suggests may be Sang-ra.

The 18th they made 3 *kos* in a strong and biting wind. Very often their animals ran away and they suspected some malicious intentions on the part of the muleteers. The next day they went almost straight north through mountains and halted after 3 *kos* in a village. Started again (the 20th) and entered the mountains to the north, ascended about one hour and found on the top a little plain and after having made a very steep descent to the north-east they found in the valley a little village and further on camped after 8 *kos*. The 21st they continued to the north-east in a valley between two mountain ranges where a little river was running in a stony bed and with stony banks, and after some hours they entered a rich valley full of villages and houses. Camped after 5 *kos*. Next day the same valley became more and more populated, and, travelling the whole day until evening, they made 8 *kos*.

The 23rd 9 *kos* took them to Kiansè of which he gives a good description. Here they stayed two days for celebrating Christmas. He says the Gran Lhama of Kiansè has under him 13 lamas, two monasteries and more than 1 000 monks. He gives a very detailed and picturesque description of a religious festival in Kiansè.

At noon the 27th they continued their journey, marching towards the north-east, and camped, after 6 *kos*, at the bank »of the river which goes to Kiansè». The 28th, going north-east they arrived at Lhamar (?). The 29th they continued on a rocky road at the foot of the mountains along the same river (Nyang-chu), marched 3 *kos* and camped in a house at the foot of a high snow-covered mountain. The name of the camping-place was Lamentutungh (?).[1]

The following passage is of some interest: »The 30th we ascended the mountain, although we did not reach the summit which was snow-covered. Ascending this mountain we saw to the northern side a long line of high mountains covered from head to foot with heavy snow, to which the muleteers made reverence, regarding them as the abode of gods. We were assured that in these mountains the snow never melts away and that they remain covered with deep snow the whole year round and that they therefore are uninhabited and inaccessible.»

Magnaghi finds it difficult to make out whether Beligatti here means the western continuation of Kamba-la or some mountains further north, on the left bank of the Tsangpo.

WADDELL has in his book an illustration of the Karo-la where snow-mountains are seen far away,[2] to the north. At Ralung, on the western side of the pass, Waddell says that »there shot into view another great snowy range which blocked our way to Lhasa. Its dominating peak of Nöjin Kangsang or 'The Noble Glacier

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[1] Magnaghi rightly says the 3 days north-east of Beligatti are difficult to understand, as Nagartse is on the same latitude as Gyangtse. It ought to have been straight west and east.

[2] Lhasa and its Mysteries p. 286.

of the Genius', rose up, 10 miles off, a majestic mass of snow and glacier ice, over 24 000 feet high, and on its western flank could be seen the cleft of the Kharo Pass which we had to cross . . . This snowy range is a continuation of that spur from Chumolhari which we saw ran off to the north along the Rham lake at Tuna.»[1] PERCEVAL LANDON says that Karo-la with its 16 600 feet[2] is »the highest point between Lhasa and India».[3] On its eastern side the road »is crowned by the snow-fields of the Nichi-kang-sang group». Probably Beligatti is simply speaking of the mountains which he saw near at hand and which therefore impressed him more. But as he talks of a long line of high snow-covered mountains to the north, one would feel tempted to think of the Nien-chen-tang-la, which is straight north from Karo-la. I do not know, however, whether this range is visible or not from the pass. It may be hidden both on the pass and in the valley beyond, and in the narratives on Younghusband's mission I cannot find a word describing any far view to the north.

On the other side of the mountain, which must be the range of Karo-la, the missionaries descended very slowly and entered a little valley, surrounded by snow-covered mountains, and pitched their tents after 6 *kos*.

On December the 31st they continued zigzagging between mountains »and after having travelled some 5 *kos* we arrived at the fortress of Nagarsè which is situated at a promontory of the lake which is called Paltè, and, passing beyond the fortress about 1 *kos*, we followed the shore of the lake, which we had to our right, whereas on our left we had the naked mountains.» Camped on the shore after 6 *kos*.

The first day of 1741 they continued to travel round the lake, »which is very great», and was said so be 18 days' walk round it going 10 *kos* a day which gives 360 *miglia* in circumference. »In the middle of the lake rises a series of small rocks, which are inhabited . . .» There are also monasteries governed by a reborn Lhamessa called Turce-pamò. He gives some very curious information about the Dorje Pagmo whom he, della Penna and the other missionaries later on met in Lhasa.

They followed the shore till evening and, having passed the fortress of Paltè, »from which the lake takes its name», and after 7 *kos* they camped on the shore of the lake.

The real name of the lake was obviously known to Beligatti, for Georgi has the following passage:[4] »Paltè: Lacus, alias Jamdrò aut Jang-sò nuncupatus.» That Georgi has used Beligatti as a source may be seen from the following passage: »Maximæ amplitudinis est, quam homo pedibus, uti indigenæ tradunt, nonnisi octo-

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[1] Op. cit. p. 283.
[2] Ryder has 16 200.
[3] Lhasa, Vol. I p. 265. Compare also Candler: The Unveiling of Lhasa, p. 210.
[4] Alphabetum Tibetanum, p. 451.

decim dierum spatio circumire queat . . . E lacu medio series surgit continuata monticulorum, & Insularum. In Australi eorum latere Monasterium, & Sedes est Magnæ Renatæ Lhamissæ Turcepamò.»

On January the 2nd they followed the shore further on and turned more and more to the north and after 2 *kos* they were at the foot of mount Kambalà, »leaving the lake to the south and ascending the mountain to the north; the ascent was somewhat uncomfortable; after having ascended for about 1 *kos* we reached the summit of the mountain, where a very precipitous descent presents itself». The descent was more difficult than the ascent had been. They saw heaps of skeletons of beasts of burden. After 6 good *kos* they entered a little plain at the foot of Kambalà and camped.

He does not say anything about the view he got from this pass which, according to Ryder, is 15,400 feet high. But Georgi has the following very interesting passage:[1] »E vertice Kambalà prospicitur nova quædam series elatiorum, nivosorumque montium ad Boream. Hinc eos adorant Indi ac Tibetani viatores.» Here at least there is no room left for a doubt, for Nien-chen-tang-la is the series of high snow-covered mountains straight north of Kamba-la, and Nien-chen-tang-la is one of the holy mountains of Tibet. Thus the Capuchin missionaries are the first Europeans who ever make mention of this mighty range, although they do not call it by name. It may have been seen by Odorico de Pordenone and by Grueber and Dorville, although of course there is not a word about it in their reports.

From Kambalà the missionaries went down to the river Tzanciù as mentioned before.[2] They crossed the river and were invited by a *Debà* who was the treasurer of the Gran Lhama to come and stay in his house which they did. The next night was passed at a little place called Tzelen (Dzialing?).

Early in the morning of the 5th »il Padre Prefetto» (della Penna) took Padre Floriano with him and went on in order to reach Lhasa the same evening and prepare the inn where the rest of the caravan would arrive the next day. The latter, with Beligatti, went only 3 *kos* and camped in the house of a Tibetan.

On January the 6th, after 1 *kos*' journey, they saw to their left the great monastery of Brebò (Brebung) where 1 400 monks were said to live. Then they passed along the wall of Putalà and entered Lhasa.

In the rest of his manuscript (30 pages in print) Beligatti deals with »Kanden, and Serra», the reception the king gave the missionaries, their visit to the Chinese resident, a Tibetan dinner, a religious festival on the last day of the year, the new year's festival, the solemn entrance of the Grand Lama in Lhasa, the festival of the 15th day of the new moon, the »Ciambà procession» and other festivals in Lhasa. The second part of the MS. is lost, probably for ever.

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[1] Alphabetum Tibetanum, p. 452.
[2] Vol. II, p. 268.

Beligatti is an excellent observer, conscientious, simple minded, quiet and plain. His narrative is a treasury, although it does not give us any new knowledge. But it throws new light on the conditions under which the Capuchins lived and travelled, and it is with the greatest sympathy and admiration one turns the pages of his little book which appeared some 160 years after it was written. He has relived in it and it is a worthy monument over his life.[1]

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[1] I cannot find the place where, according to Wilford, F. Cassiano (Beligatti) should have called the Mount Méru or Tien-c'han — Tangra or Tangla (Asiatic Researches, 1808, Vol. VIII, p. 315). I quote the following passage from Wilford. Speaking of de Guignes' view that Siue-shan should be the southern part of the circle of mountains north of India, he says: »The Southern extremity of this circle is close, according to the present Hindu maps, to the last, or Northern range, called Nishad'ha; and this is actually the case with the mountains of Tangrah, near Lassa, which is in the interval between the second and third range. According to F. Cassiano, the mountains of Tangrah are seen from the summit of Cambálá, several days' journey to the Westward of Lassa. The famous Pura'n-gir left them on the left, in his way from Tissoo-Lumbo to China, at the distance of about twelve coss, and did not fail to worship them. At the distance of seventy-seven coss from the last place, he reckoned Lassa to be about twenty coss to the right; twenty-three coss beyond that, he was near the mountains of Ninjink Tangrá, a portion of that immense circular ridge. In his progress toward the famous temple of Ujuk, or Uzuk, called Souk in the maps, he saw them several times. Close to Ninjink-Tangra he entered the mountains of Lurkinh, called Larkin in the maps.»

It is interesting to find the name Nien-chen-tang-la mentioned so long ago. It is corrupted, but very easy to recognise. It will be seen later on that when Hodgson called the northern mountains Nyenchhen-thangla he had got this name, — not from Purangir or Wilford, but from Ritter. Even Klaproth was not the first to introduce it, for it was known in India before he published his Chinese geographical texts.

The Tangra or Tangla is d'Anville's Tancla M. the highest summit of which is his Tchimouran. Purangir's Lurkinh is d'Anville's Larkin M. and Nain Sing's Dam-largen-la. From whatever source Wilford has got his information that Cassiano Beligatti saw the mountains of Tangrah from Kamba-la, the statement is no doubt correct, for Beligatti could see Nien-chen-tang-la, d'Anville's Tancla from the pass.

CHAPTER IV.

ORAZIO DELLA PENNA.

The short and splendid description of Chang-tang in DELLA PENNA's memoir on Tibet, as published by KLAPROTH, should not be missing when in the history of exploration in Tibet, we try to approach Transhimalaya.[1]

In della Penna's description of Kamba-la and Yamdok-tso we recognise the same observations as made by Beligatti and as used by Georgi.

»L'ultimo luogo (of the province of Tsang) verso levante si chiama Kambalà, che è nome di un monte grande, alla falda del quale vi sono molti luoghi; e nel piano di questo monte vi è un gran lago detto Iandro verso mezzogiorno, che ha di circuito 18 giorni di camino, ma dentro vi sono alcune isole di monticelli. Il detto lago non ha esito alcuno almeno visibile, e per quella parte, ove l'ho costeggiato sì nell' andare, che nel venire per un giorno e mezzo di camino non ho veduto esito vezuno, ed il simile per ogni altra parte, come mi viene certificato da quelli medesimi che l'hanno costeggiato.»

The circumference is considerably exaggerated, but an outlet does not exist, although there may have been one in an earlier period, probably at Yarsik and through the valley of Rong-chu.[2] Waddell gives an analysis of the water[3] and says the water is slightly saline, which proves directly that 160 years are not sufficient for making a lake without outlet very brackish. On the Lamas' map, which is earlier than della Penna's statement, there is no outlet either. The difference between Yamdok-tso and Rakas-tal is that the water of the latter has not even a suspicion of taste. One thinks of Moorcroft's desperate search for an outlet from the Manasarovar when one reads how della Penna searched in the same way and heard from others that nowhere else had the Yamdok-tso any outlet. The difference is that Moorcroft was both right and wrong but della Penna perfectly right. For Manasarovar has a periodical outlet and Yamdok-tso none at all.

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[1] »Breve Notizia del regno del Thibet, del frâ Francesco Orazio della Penna di Billi, 1730», with notes by Klaproth. Nouveau Journal Asiatique, Tome XIV. Paris 1834, p. 177 et seq. The style of della Penna is so plain and simple that I prefer to give it in the original language.

[2] Compare Burrard and Hayden: »A sketch etc.» p. 202. Ryder: Geogr. Journal Vol. XXVI, 1905, p. 374. Perceval Landon: Lhasa Vol. II, p. 92, Waddell, Op. cit. p. 299, etc.

[3] Op. cit. p. 473.

»La provincia di Ciang verso ponente confina con Ngari, verso tramontana con Kokonor, verso levante con K'ham, verso mezzogiorno colla provincia d'U. In questa provincia di Ciang ci è il ducato di Dam, che è lontano otto giornate da Lhasà: ed in Dam ci è solo il palazzo per il Re e la sua corte; il restante degli abitanti dimorano nelle tende di feltro, e di tele tessute di pelo, e la maggior parte sono Tartari e gli altri Thibetani. Due giornate lontane da Dam ci è Nak c'iu ka, ove è l'ultima fortezza del Thibet senza alcun altra casa, ma solo abitazioni di tende, come sopra. In questo luogo passa un fiume grande chiamato Nak C'iù. Nak significa nero e c'iù acqua . . . Dopo di che per circa quaranta giorni di camino non si trova più abitazioni di case, ma solo alcune abitazioni di tende con quantità di mandre de Iak, ossiano bovi pelosi, pecore, cavalli; ed i passaggeri non trovano altra cosa per comprare di comestibile che carne, e butiro, tutto l'altro fa di mestieri portar seco. Traghettato questo gran paese si trova un grandissimo fiume, chiamato Bic'iù (Bri-chu or Murussu), che conforme ne scrisse l'illustrissimo signor Samuele Van der (Put), Olandese . . . si arguisce la sua grandezza, mentre da quel che diceva che per traversarlo con barche di pelle, s'imbarcò la mattina, e la sera aloggiò in un isoletta di detto fiume, e non potè finirlo di traversare sino al mezzo dì del seguente giorno. Vicino a questo fiume ci è una gran populazione che habita nelle tende. Da questo luogo per un mese incirca di camino si trova Zolomà (Gourban Solom gool, — Klaproth); le genti di che abitano parimente nelle tende, e dopo cinque giorni di camino si arriva a Kokonor, ove finisce il Thibet per questa parte verso tramontana . . . Tra la Tartaria, e le provincie di Ciang e Ngari, stanno i popoli di Hor, quali sono d'ingegno grossolano, portano la treccia, come li Tartari, e vestono alla tartara; stanno nelle tende, e parlano tartaro, e thibetano, ma meglio tartaro.»

Thus Dam is a duchy eight days from Lhasa and two days from the famous place Nak-chu on the upper Salwen, where all the Mongolian caravans are examined before they are allowed to proceed to Lhasa. Purangir says he entered the mountains of Lurkinh or Larkin near Nien-chen-tang-la. Dam and Larkin sound rather like Nain Sing's Dam-largen-la in the same region. At any rate here is the place where one would have expected to hear something more of the high snowy mountains which della Penna as well as Beligatti saw from Kamba-la.

Then follow forty days' journey without any houses and then Murussu, and here, unexpectedly, we get a welcome glimpse of the great Dutchman VAN DE PUTTE and the way in which he crossed the great river. Professor P. J. VETH[1] suggests that della Penna may have got the whole description of the country to the N.E. from van de Putte.

Della Penna gives the same misleading determination of the country of the Hor as Beligatti, but he correctly calls them Tartars, although these Turkish tribes, nowadays, only when in direct Chinese service, wear a pigtail. Klaproth adds in a note that in reality Mongol tribes wander about with their flocks on the vast plains of Ngari Tamò and Tsiang and that these tribes are called Hor by the Tibetans.

Della Penna gives the correct translation of the name Koko-nor, and Tso-ngombo. He tells us that he has got the following information from reliable persons:

[1] Loc. cit., p. 11.

»I Thibetani pretendono, che questo lago appartenga a loro, e che i confini del Thibet arrivino a' confini della città di Scilin, ossia Scilingh, come essi asseriscono. Da questo lago non esce fiume alcuno. Li cinque fiumi che comunemente fanno uscire le carte geografiche antiche da un lago, o sia il sopracitato Iandrò, o Iantzò che sta lontano tre giornate da Lhasà a ponente, o sia il suddetto lago di Kokonor circa una giornata da Scilin, o Scilingh, a confini del Thibet, che sono li due soli laghi del medemo, sono insussistenti, ed assolutamente ideali, perchè verun fiume esce da' medesimi laghi; ma sono altri fiumi grossi, come si disse di sopra, cioè vicino a Lhasà Tzange'iù nella provincia di Tzang, l'altro detto Nake'iù, così ancora Bie'iù, che sono nello stato di Ciang, ed altri due che ne ho perduta la memoria.»

Della Penna has generally paid more attention to the rivers and lakes. There is no sign of Transhimalaya in his letter.

In another document from della Penna's hand, published in Rome in 1742, and with a purely religious intention, we cannot expect to find anything interesting for geographers.[1] The only thing worth mentioning is his enormous exaggeration of the population of Tibet, which we meet in the very first lines:

Essendo composto il gran Regno del Tibet, la di cui Capitale è Lassa, di più milioni di anime, (che si dice ascendere a 33 milioni) & avendosi poca cognizione anche dalle antiche carte geografiche di questo Regno, che è contiguo a quelle della Cina, e della gran Tartaria...

The great number of inhabitants was, however, a *pia fraus* to convince the religious people of Rome of the great importance of sending a sufficiently great number of missionaries as well as sufficient subsidies to Tibet. And the conclusion is therefore the following:

Quanti Ministri Evangelici siano per questo necessarj in un Regno si vasto, che contiene tanti milioni d'anime, quantunque per ciascuna Provincia non si destinassero più di cinque o sei Missionarj, ben si comprende...

[1] Relazione Del principio, e stato presente della Missione del vasto Regno del gran Tibet, ed altri due Regni confinanti, raccomandata alla vigilanza, e zelo de' Padri Cappuccini della Provincia della Marca nello Stato della Chiesa. Roma 1742.

CHINESE SOURCES

D'Anville, 1733.

CHAPTER V.

D'ANVILLE.

In the narratives of the first European travellers in Tibet and even in the diaries of the missionaries who lived for many years in Lhasa, we find nothing concerning the high mountain ranges situated north of the Tsangpo.

But if we direct our attention to the Chinese geographers we shall find a good deal of positive information about the labyrinth of mountains situated north of the river. As in other parts of Asia the Chinese have also here been the forerunners of exploration, and till not very long ago they have even provided European maps with all that was to be found on them, so far as the country north of the upper Tsangpo was concerned.

On the following pages I will give some extracts from the Chinese sources together with the necessary discussions.

Let us first turn our attention to the beautiful map of D'ANVILLE, published under the title: *Carte generale du Tibet ou Bout-tan et des Pays de Kashgar et Hami Dressée sur les Cartes et Memoires des RR PP Jesuites de la Chine et accordée avec la situation constante de quelques Pays voisins. Par le S^r d'Anville, Geographe Ord.^re du Roi. Avril 1733.* This map was published in DU HALDE's *Description de la Chine*, and in d'Anville's *Nouveau Atlas de la Chine, 1737*. The map which had been drawn by the Jesuits by order of Emperor Kang Hi was engraved at Peking, and a copy was sent to Paris and presented to the King and remained in his private library at Versailles till the epoch of the revolution. Copies of the same maps, translated in China, were also delivered by Father du Halde to d'Anville, who was a famous draughtsman and the King's geographer. His business became to make a reduction and digestion of the Chinese maps. But the copies he got were not complete and the translator of the geographical names had not been very careful. Therefore several mistakes entered d'Anville's maps, for which he could not be responsible. Only the detailed original maps of Tibet, which were inserted in du Halde's *Description*, have been copied by d'Anville in a more exact way. On the great general map of Tibet, of which Pl. I is a reproduction, d'Anville has changed the co-ordinates for some places, and has by this, as

Klaproth shows, not improved the map.[1] Pl. I is a reproduction of this map, which marks an epoch in European knowledge of Tibet. Here for the first time Eastern and Southern Tibet have been well placed in relation to Central Asia, Szechuan and India. The Indo-Chinese rivers come down from a world of Tibetan mountains, and it can easily be guessed that the upper Tsangpo is situated between two tremendous systems of mountain ranges. In the west we find the excellent representation of the sources of the Tsangpo and the Satlej which has been dealt with before,[2] with the only exception of the mistake about the origin of the Ganges. Central and Northern Tibet, on the other hand, remain unknown, and the Chinese material d'Anville has had at his disposition has not been sufficient to prevent him from the supposition that »Cobi ou Desert de Sable» continued without interruption from Eastern Turkestan to the neighbourhood of Tengri-nor. Western Kwen-lun and Eastern Kwen-lun are shown as two different mountain systems quite independent of each other. Eastern Turkestan is not nearly so good as on RENAT's and STRAHLENBERG's maps. Yarkand-darya is correctly shown as going the whole way through the desert to old Lop Nor, but Aksu-darya comes to an end at the town of the same name. South of Khotan is a Mount Kirian, which is probably meant to be the Keriya-kotel on the old road between Khotan and Lhasa, to which we shall have to return later on.

Of great interest is the legend at the end of Hotomni-Solon Mouren or Khotan-darya: *Cette Riviere se perd dans les Sables de ce Desert demême que plusieurs autres.* For if this legend were correct and if it were to be accepted literally the climate of Eastern Turkestan would be more humid now than in the days whence d'Anville has drawn his information. At the present epoch Khotan-darya reaches, as we know, the Tarim during some weeks every summer. Curiously enough not a single tributary, on d'Anville's map, reaches the main river, except the Hajitou Mouren. But the latter is the river of Kara-shahr, Khaidu-gol, which in reality passes the Bagrash-kul on its way. West of Harachar (Kara-shahr) we recognise some other names, as Couroulac (Korla), Yantac (Yantak-chikke) and Yanghisar (Yangi-sar). The whole situation of the Yarkand-darya and Khaidu-gol

[1] Mémoires Relatifs à l'Asie, Tome III, p. 372. March 1834 Klaproth wrote to Berghaus, at his request, a letter about the Tsangpo-Irrawaddi problem in which he expresses no high opinion of the Lamas' map. He says: »Aus Duhalde wissen Sie, auf welche Weise die Karte von Tübet, welche sich in dem dazu gehörigen Atlasse findet, entstanden ist. Es geht daraus hervor, dass dieser Karte nichts als die auf derselben verzeichnete Reiseroute von Tschhing tu fu, über Lassa bis zum See Mapam dalai, und einige schlechte tübetische Skizzen anderer Provinzen zum Grunde liegen. Wie wenig auf ein solches Machwerk zu bauen ist, ist leicht einzusehen, zumal wenn man weiss, dass die Originalzeichnung der Lamas gar nicht graduirt war, und die Längen- und Breitengrade erst in Peking von den Jesuiten dazugesetzt worden sind, und das zu einer Zeit, wo man über die geographische Lage von Lassa gar nichts anderes hatte, als die sehr vague Angabe des P. Grueber . . . Tübet ist also ein Land, über das man keine einzige astronomische Beobachtung hat, als die von Turner, und das auch eigentlich nie aufgenommen worden ist . . .» Berghaus: Historisch-Geographische Beschreibung von Assam und seinen Nachbar-Ländern . . . Memoir zu No 9 von Berghaus' Atlas von Asia. Gotha 1834, p. 175.

[2] Vol. I, p. 267.

on d'Anville's map, in their relation to Lop-nor, points to the fact that it is the real, ancient, Chinese Lop-nor that has been entered on the map and not the recent lake, Kara-koshun which was discovered by PRSHEVALSKIY. Thus we here arrive at the same result as when we were discussing Renat's map, which is not surprising remembering that the latter was also derived from Chinese sources. As to the other tributaries Renat has at least three reaching the Tarim amongst them Khotan- and Keriya-darya. In this respect the two maps are therefore not in harmony with each other, and no conclusion can be drawn as to whether d'Anville's map indicates a dry period of climate. Very likely periodical changes of climate exist in Eastern Turkestan, though not so strong as in the region of the Manasarovar.

But to return to Southern Tibet we find that the river systems and lakes are very nearly the same as on the Ta-ch'ing map, which we are going to consider later on in connection with Dutreuil de Rhins' views. Both are founded on the same original survey, — of Kang Hi's Lamas.

Regarding the Central Transhimalayan mountain ranges on d'Anville's map most of them stretch from the N.E. to the S.W., whereas the real direction is usually from the N.W. to the S.E. When a range, like Targo-gangri is in reality meridional, it becomes west to east on d'Anville's map. A few names may be identified beyond doubt. Amongst them we already know Kentaisse M., Lantchia kepou M., and Tamtchou M. Larkin M. is at the same place as Nain Sing's Dam-largen-la. Samia M. must be Samye-la, Yala M. may be my Yor-la, and Soureng M. could be my Surnge-la if it were not so far to the east. Lop M. is probably Lapchung, Pancla M. may be my Pabla or Pab-la, Tarcou MM. is certainly Targo-Gangri, Coiran MM. and Tchimouran[1] are the names given to the culminating range, Nien-chen-tang-la. Samta Kemsa M. is Samdan Kangjang. It cannot be said that regarding the country north of the Tsangpo general uncertainty predominates, for all is certainly wrong. Only round the edges of the region are there comparatively good pieces. On the northern edge there is only one such point: Tarok-tso and Tabie-tsaka; on the eastern Tengri-nor, Nien-chen-tang-la and Ki-chu as well as Lhasa with its surroundings. On the south the whole general course of the Tsangpo to the E.S.E. is not bad and all the northern tributaries have been observed, more or less wrong. The best parts are on the western edge, the sources of the Brahmaputra or Tsangpo, which I have proved to be correct. Directing our attention to the northern bank of the Tsangpo, we find only at two places mountain ranges running parallel with the river and near to it. The first is the range west of the entrance of the Tsa-chu, and the second is the one situated east of the entrance of the Chaktak-tsangpo. Both exist in reality. For the section east and west of Shigatse d'Anville has no ranges parallel with the river. The

[1] The name is written Tchimourtan on d'Anville's large scale map in du Halde.

country is here too little known to make it possible for anyone at all to settle the question, but d'Anville may be right, or rather the sources which he has used.[1]

Of great interest is d'Anville's Temen M. N.E. of Tengri-nor, which probably corresponds to Abbé Huc's Tangla. Klaproth shows that the name Temen belongs to a plain, Temen tala, situated north of Iké Nomkhoûn oubachi and south of the river Baka Akdam. »Dans les cartes de d'Anville, et par conséquent dans toutes les postérieures, cette montagne (Iké Nomkhoûn oubachi) est nommée par erreur M. Temen.»[2] Very likely this Temen M. or Tangla may be the eastern continuation of one of the great Kara-korum ranges.

If nothing else can be learnt from d'Anville's maps regarding Transhimalaya, one would always suspect, when looking attentively at these maps, that there could not possibly exist one continuous range, but very probably a whole labyrinth of different and more or less separated ranges. One would think that perhaps in reality there existed a great number of ramifications stretching out their arms in different directions from a principal range. But there is no sign of such a range on d'Anville's map in the region corresponding to the one I explored. If HODGSON and SAUNDERS had studied the Chinese maps attentively they would have hesitated to enter on their maps a continuous mountain range parallel with the whole of the Tsangpo and without ramifications. But as they did so they must have regarded d'Anville's maps and other maps founded on Chinese material as very unreliable.

To do so would indeed be unjust, for we have seen that the map is very uneven and of different value in different parts. We have seen that extremely seldom, practically only in the cases of the sources of the two great rivers, the mountains are correct. In three or four cases the lakes are rather good, in some cases rivers which do not exist, as the Tarcou Tsanpou and probably the Nacoi R., are drawn on the map. We arrive at the conclusion that some parts have really been roughly surveyed, others filled in from verbal information, which is always misleading. Therefore such lakes as Shuru-tso and Dangra-yum-tso have been placed in a way which has not the faintest resemblance to the truth. Such lakes as Teri-nam-tso, Poru-tso, Shovo-tso, Nganglaring-tso and others cannot be found on d'Anville's map. On the Ta-ch'ing map the Dzolmié thang is the lake which both in form and situation has the greatest likeness to Nganglaring-tso. It is to be found on d'Anville's map as well, north of M. Mouron. If, on d'Anville's map, Cal M. should be meant to represent Ka-la, a very important pass on the »gold-road», the lake, from which Nacoi R. comes would be Nganglaring-tso. But one loses oneself in guesses when trying to identify the representation on d'Anvilles map.

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[1] The marked water-parting close to the whole northern bank of the Tsangpo and Raga-tsangpo as represented on the map of the Tibet Frontier Commission, 1904, which gives the impression of a continuous range running the whole way parallel with and very near the Tsangpo is certainly wrong. That this water-parting was really accepted by geographers as an uninterrupted range, can easily be seen on map N:o 62 in Stieler's Hand-Atlas for 1910. Compare also edition 1911, Pl. XXXI below.

[2] Mémoires Relatifs à l'Asie, p. 391.

What, then, have we learnt from the Chinese materials regarding the country north of the Tsangpo? Looking at the results of the survey in Tibet during Kang Hi's and Chien Lung's time, as represented on d'Anville's and de Rhins' maps, we might be sure that the country is very rich in lakes and rivers situated between mountain ridges and ranges. But what is the value of this material? During a long period it was accepted on European maps. But then the whole lot was suddenly abolished and the country north of the Tsangpo, except those peripheral parts which had been seen by Nain Sing, Littledale and the Tibet Frontier Commission, was left blank. When this new peripheral exploration had been in contact with the Chinese survey, the latter was found to be altogether too unreliable for use. And every bit of the Chinese survey disappeared, which, as Dutreuil de Rhins has proved, was the only right thing to do. Only two or three deplorable losses were made in this great general cleansing, namely, the sources of the two great rivers and the Tarok-tso. The sources of the Satlej and the Brahmaputra had therefore to be rediscovered. Nganglaring-tso and Teri-nam-tso were heard of by the Pundits, but as they were not entered on the Chinese maps, there was no ground for accepting the Tarok-tso either. Teri-nam-tso and Nganglaring-tso were visited for the first time in 1908, and if I had not, on the same journey, found the Tarok-tso as well, the fate of that lake would probably have been unsettled for a long time to come.

Regarding the Transhimalaya the Chinese maps have certainly considerably augmented our knowledge. But these maps as well as the Chinese texts only tells us clearly that mountains *exist* north of the Tsangpo. We could, however, be certain of their existence even without the Chinese affirmation. Already Desideri and della Penna had mentioned mountains to the north, although only on the extreme western and eastern wings of our region. The Chinese reports are more complete, but leave us in uncertainty regarding the situation and general arrangement. Of course mountains must exist in the north, as the northern tributaries of the Tsangpo were described as considerable rivers. If nothing else was known of the interior of Tibet one could, even two hundred years ago, be fairly sure that the country was very rich in mountains. And in the middle of the last century it would have been just as absurd to suggest a plain, a sand desert or a forest land north of the Tsangpo, as to suggest the existence of inland ice over the Congo basin. From the time of the first Chinese surveys some 190 years should pass before the first fundamental order was introduced into a great part of this labyrinth of mountains.

CHAPTER VI.

KLAPROTH.

With d'Anvilles *Noveau Atlas de la Chine*, published 1737, and containing amongst the maps of China the one of Tibet (1733) discussed in the preceding chapter, begins the history of European knowledge of the Transhimalaya. All other maps of Tibet, printed in Europe, are, until the first quarter of the last century, simply copies of d'Anville's Tibet.[1] But a still more important epoch in this history is marked by the information from Chinese sources translated and published by J. KLAPROTH. He was the first to direct, in a more positive way, the attention of geographers to the existence of a mountain system north of the Tsangpo. Klaproth was the great conqueror in the Chinese literature; he collected the material, which afterwards, from a purely geographical point of view, was sifted and arranged by RITTER and HUMBOLDT. But Klaproth himself also laid down his conquests on a map, which for a long time was regarded as gospel concerning these regions, until fresh exploration brought new material and broke down the Chinese orographical system.

In a preceding part of this work I have already quoted some extracts from Klaproth touching the Chinese description of the Kailas.[2] He calls it Gangdis ri, or the mountain of snow colour.[3] It is at 310 li N.E. of the town Taklakar dsong in Purang, the province of Ari (Ngari), and at 5,590 li direct east from Si-ning-fu in Kansu. Mount Kailas raises its peak 550 Chinese fathoms above the range to which it belongs,[4] and it has a circumference of 140 li. It is surrounded by other very high peaks, but surpasses these by more than 100 fathoms. For those who travel from China to the S.W. the ground rises the whole way until they reach mount Kailas, »which is the highest point of the whole range, the direction of which one is following.»[5] This range subdivides itself into several branches, which traverse the country in winding directions. To the N.W. of the Gangdis ri, is the snowy

[1] Compare also G. Wegener in: Festschrift Ferdinand Freiherrn von Richthofen . . . dargebracht von seinen Schülern, Berlin 1893, p. 402.

[2] Vol. I, p. 110.

[3] Quoting the Polyglot geographical Dictionary published in Peking, Klaproth informs us that *gang* is snow, and *ri* mountain in Tibetan, whereas *dis*, colour, is Sanscrit.

[4] I. e. the Transhimalaya.

[5] Magasin Asiatique, Tome II, N:o IV, Paris 1828, p. 233.

peak Sengghe kabab gangri.[1] Many other Gangris or mountains with eternal snow surround the province of Ari and continue north-eastwards to the country of Katsi. To the N.E. of Gangdis ri are the mountains called Dabrie sierké, Ghioouké niantsian tangla, Samtan gangdza, Nomkhoûn oubachi and Baïn khara, which surround the province of Oui (Wei) on its northern side, and pass by the sources of Hwangho and lake Koko-nor at a distance of more than 6,000 li all the way to Si-ning-fu and other places on the frontiers of Kansu. Two other branches of mountains issuing from the Kailas are described, one bordering Ngari on the south and the other with the massive of Tamchok-kabab, where the Brahmaputra has its source.

This orography is far from being clear, though there is much truth in it. Another chain is said to form the boundary of Ngari in the following way: Tsa tsa la, 450 li north of the town of Lodok gardzoung. This mountain borders upon the one called Kerie dabahn.[2] To the N.W. of Lodok gardzoung, at a distance of 300 li, is Labsi la. At 830 li S.E. of Ladak dzoung is Noubra la. These three mountains form a chain, which is the northern boundary of Ari.

Maryum-la is mentioned in the following words: Mar young la, mountain of the glory, 280 li to the east of the tribe of the Djochots. It is a branch of the Gangdis ri which stretches to the south. Its southern wing constitutes the western boundary of the province of Dzang; the northern one belongs to the province of Ari.

There are several other mountains mentioned in the Chinese description more or less easy to identify. Only a few of them seem to be parts of our Transhimalayan system. The most important of them is the Nien-chen-tang-la, described as follows: Niantsin tangla gangri, or the mountain of the snow-fields of the divinity who is bringing oracles; 130 li N.W. of the city of Poumdo dzoung. It is near the S.E. shore of the lake Tengri noor, extremely great and high, and covered with eternal snows. One sees there a great many snow-fields.[3]

A part of Transhimalaya is also Samdan gangdja ri or Samtan gangri, snow mountain of the divine contemplation, 180 li N.E. of Poumdo dzong, — and called Samto Kemsa on d'Anville's map.

The Chinese geographer who is the author of these passages has done his best to arrange this hopeless labyrinth of chains and ranges into one system, the head of which is the Kailas and the branches of which are the different ranges, all of them starting from the Kailas. To this Chinese system AMIOT adds the follow-

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[1] At another place the Chinese author places this peak more correctly to the north of Kailas. In reality Singi-kabab is not a peak with eternal snow, but a comparatively low mountain.

[2] Keriya-kotel.

[3] In Amiot's translation this passage runs thus: Nien-tsien-kang-la-chan. Elle est au nord-ouest de Peng-touo-tcheng, dont elle est eloignée de cent trente lys. Elle touche au bord oriental du lac de Teng-ka-ly-tché. Elle est très-haute et toujours couverte de neige. — Mémoires concernant l'Histoire, etc. des Chinois. Tome quatorzieme, Paris 1789, p. 162.

ing words: »J'ai dit que Kan-ty-see-chan se partageoit en plusieurs branches. Celle qui s'etend vers le nord-ouest, prend le nom de Seng-ko-ka-pa-pou-chan, et se partage ensuite en plusieurs rameaux, qui ont chacun leur nom particulier. Quoiqu'on n'apperçoive pas toujours la chaîne qui lie toutes ces montagnes les unes aux autres, on ne sauroit douter, qu'elles ne soient réellement liées par des veines internes, cachées dans le centre de la terre.[1]

The most interesting and clever attempt to introduce order into the Chinese orography of Tibet is, however, included in Klaproth's article: *Tableau des plus hautes montagnes de la Chine d'apres les ouvrages géographiques des Chinois.*[2] He arrives at the conclusion that Tibet is traversed, from west to east, by three extremely high mountain ranges. The southernmost of them is the Himalaya of which he says that it passes south of the two great lakes Rawan hrad and Manas Sarovar, from which the Satledj begins; further on it stretches north of the sources of the Burrampouter, — by which we have to remember that Klaproth regarded the Tsangpo and the Brahmaputra as two different rivers; and finally it is pierced by the deep gorge of Singghian khial, through which the Yarou dzangbo tchou takes its course.

Having thus located the Himalaya he proceeds to the second and third chains, a description which is really classic and therefore his own words should not be altered:

La seconde chaîne principale du Tubet commence à l'ouest par la cime gigantesque, nommée en tubetain Gang-dis-ri et par les Hindous Kailasa; elle renferme les sources du Yarou dzangbo tchou, se dirige de là vers l'est, à une certaine distance au sud de ce fleuve; plus loin s'approche de sa droite et l'accompagne jusqu'au delà du lac Yar brok yumdzo ou Palté, entoure celui-ci de trois côtés, se dirige à l'est entre le Yarou dzangbo tchou et le Loubnak tchou, et finit au défilé Singghian khial. — La troisième chaîne est la prolongation orientale de celle de Kara korrum; elle commence á l'endroit où cette dernière se joint à une branche du Kaïlasa, venant du sud, sépare le Tubet du pays occupé par des hordes nomades des Khor ou Mongols, entoure les lacs desquels sort le Tarkou dzangbo, grande rivière qui se jette dans le lac Tengri noor, nommé mal à propos sur nos cartes Terkiri. La chaîne poursuit son cours au sud, touche le bord méridional du lac, forme, à son angle sud-est, un amas de glaciers très-élevés, qui portent le nom tubetain de Nian tsian tangla gangri, se dirige au nord-est où elle finit au mont Sam tan gandza, couvert de neiges perpétuelles, et situé sur le bord oriental du lac Boukha noor. Ces trois chaînes du Tubet communiquent ensemble par plusieurs chaînons intermédiaires, qui ne laissent pas d'être très-élevés et dont plusieurs montrent encore de glaciers sur différens points.

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[1] Mémoires, p. 156.
[2] Magasin Asiatique, Tome II, N:o III, Paris 1826, p. 133.

In Tibet these three chains are comparatively regular but further east they disappear altogether, or rather join into an immense knot of mountains, just as in the west of Tibet. Klaproth complains that the missionaries in their works on China have completely omitted to pay any attention at all to the physical geography. The Chinese are nothing less than geologists. They have no general names for the mountain ranges in their country. Every mount is particularly designated in relation to its form, its height, its situation or other remarkable circumstances. Klaproth therefore finds it very difficult to follow on the maps the stretching and direction of the principal chains. The single basis he has been able to use is the indication of the height and the eternal snow of different mounts, and, combining this material, he is able to draw the chains on his map. This method must of course lead to very uncertain results, still, the summary given above shows that Klaproth worked in the right direction and that he had reached a long way beyond d'Anville. In fact he inaugurated a new era in European conception of Tibetan orography.

Klaproth's second range which he makes start from the Kailas, is situated south of the Tsangpo, and therefore to a certain extent, and especially in its central part identical with Colonel Burrard's Ladak Range, and with Reclus' Transhimalaya.

The third chain in Klaproth's system is of the greatest interest to us. Here for the first time, an attempt is made to join all the different ranges of d'Anville north of the Tsangpo into one mountain system, which partly corresponds to Burrard's Kailas Range. Klaproth does not hesitate to call this chain the eastern prolongation of the Kara-korum, a view which, later on, was adopted by one or two geographers. With the limited material that was at his disposition, it is wonderful that Klaproth could reach so far in the right direction, for, though this problem is not yet definitely settled, Klaproth was very likely right. Further east the third chain is the southern boundary of the Mongol nomads, a view that is nearly correct and which in later years was adopted by Humboldt, Ritter, and Brian Hodgson. A part of the chain is supposed to surround the lakes from which the Targo-tsangpo comes, a view that is wrong in so far that the Targo-tsangpo in the sense of d'Anville and Klaproth does not exist. But regarding the situation this hypothetical river occupies on d'Anville's and Klaproth's maps, we can easily understand the conclusion of the latter. The continuation of the chain is very well placed, namely along the southern shore of Tengri-nor where it rises into the high glacier massive of Nien-chen-tang-la. In Sam tan gandza the chain finally comes to an end.

In the *Wei-Tsang-t'u-chih* or Notice on the Provinces Wei and Tsang, published by Klaproth,[1] we read a very interesting description of North and East Tibet:

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[1] Nouveau Journal Asiatique, Tome IV, p. 81, and Tome VI, p. 161 and 321, Paris 1829 and 1830.

»En allant de H'lasseï-tsiô-k'hang,[1] vers le nord, on sort par le défilé de la rivière de Yang-ba-djian, on passe le pont neuf, et on entre dans la plaine. A l'ouest de ce point commence le Tubet ultérieur, qui s'étend à l'est jusqu'au monastère de Ghâldan; au nord, on traverse de vastes prairies et on arrive à la rivière Mourou oussou et à Garzzang-goutcha, sur la frontière du pays du lac Koukou-noor. Au nordest du H'lasseï-tsiô-k'hang, on passe par la montagne Keriye-la, par Nak-tsang, et autres endroits, on traverse le désert de Gobi et on arrive sur le grand chemin qui conduit à Yarkiang et à la nouvelle frontière. Toute la contrée est sabloneuse et remplie de cailloux; l'eau et l'herbe y manquent. Les gens du pays l'appellent Gobi et Ola, c'est-à-dire les Montagnes.»[2]

Ritter already observes that the Chinese author has N.E. instead of N.W. for this extraordinary road which nowadays is never used, nor even known by the natives. The Keriye-la is, as Klaproth observes, the Keriya-davan of the Turkish tribes of Little Bokharia or Eastern Turkestan. The usual name is Keriya-kotel. It is less surprising that the pass was known to the Chinese in 1791—92, than that a road is reported to have crossed the whole of the Tibetan plateau land diagonally from Lhasa to Keriya and Yarkand, probably passing through the province of Naktsang, and, of course, crossing the Transhimalaya. It may be that after the conquest of the country of the Dsungarians and of Eastern Turkestan, Chien Lung wished to establish communication between the different parts of the empire, and as the frontier was new, the road may have been a new one. But it is also possible that it was a very old road. At any rate the road was known to exist in 1792, and no other road on the earth could be compared with it in absolute height the whole way long. It may have been the same road on which the general of Tsevang Rabtan, Tseringdondob, marched with his army in 1717 from Eastern Turkestan, »auf höchst beschwerlichen und gefährlichen Pfaden über das Gebirge südlich von Khotan in den Norden des Schneereiches ein und soll sogar die Defilés am Geistersee (Tengri Noor) und die noch südlicheren, wenige Tagemärsche von der Hauptstadt gelegenen, die nur auf Kettenbrücken überschritten werden können, widerstandslos passirt haben . . .»[3]

It is curious that 200 years ago there should have existed a road through the Chang-tang, passing the Kwen-lun, the Kara-korum and Transhimalaya and all the other parallel ranges, between Khotan and Lhasa, and that it should be possible to take an army that way. Those who believe in modern climatic changes

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[1] Lha ssai mtschhod khang, Lhasa's house of sacrifice. Compare Köppen, op. cit. p. 334.

[2] Rockhill has made some extracts from the same work. He gives the names of all the stations on the road from Lhasa to Sining in Chinese. On the section from Lhasa to Nakchu Nien-chen-tang-la must be crossed. On the southern side of the 5th station is the Cha-la mountain; south of the 9th station is mount Cho-tzŭ, and south of the 11th station is the Lang-li mountain, which may belong to our Nien-chen-tang-la. Of the road to Yarkand Rockhill has the following passage: »North-west from the Jo k'ang of Lh'asa, passing the Ko-li-yé la and mount Na-ko, one comes by the Gobi (Kou-pi) to the high road to Yarkand (Yeh-erh-chiang) and the New dominion.» Journal Royal Asiatic Society 1891, p. 102 and 202.

[3] C. F. Köppen: Die Lamaische Hierarchie und Kirche. Band II, p. 194.

will perhaps say that obviously the climate has changed since 1717 as it is nowadays difficult to cross even with a caravan. But we know that Tseringdondob's army reached Lhasa in a very exhausted condition. It captured the city on the last of November.[1]

On the road between Lhasa and Tashi-lunpo we recognize several names in the itinerary of *Wei-Tsang-t'u-chih*. The road goes from Lhasa to

Tenglung kang	= Tö-lung-chu
Nedanwar	= Ne-thang
Kiang-li	
Khiu choui	= Ki-chu
Tsiouchoul dzông	= Chushul-dsong
Yœrou zzang bo	= Yere-tsangpo
Gamba dze	= Kamba-partsi
Gambou la	= Kamba-la
Djamaloung	= Tramalung
Baldhi	= Pedi-dsong
Jesse	= Yarsig
Talou	
Nagar dzông	= Nagartse dsong
Onggou	= Onggo
Je loung	
Kussi	= Gobshi
Ghiangzè dzông	= Gyangtse-dsong
Jen dzin gang	
Baïnam	
Tchhun doui	= Dongtse
Djachi h'loumbo	= Tashi-lunpo.

The Chinese author describes the road between Chushul and Pedi-dsong in the following words:

»De Tsiouchoul-dzông il y a 15 li jusqu'au pont en chaînes de fer; la vue du fleuve (Yœrou zzangbo) y est majestueuse et effrayante; on le passe aussi sur des barques de bois. Ayant traversé le fleuve, on marche encore 35 li jusqu'à Gamba dze, où il y a des habitations, du bois et du foin; ensuite la route passe par le sommet de la haute montagne (Gambou la). La montée et la descente forment en tout 40 li jusqu'à Djamaloung, où l'on ne trouve que peu de bois et de foin. Plus loin la route est unie et l'on arrive, après 50 li, à Baldhi; on y trouve une auberge, du bois et du foin.»

This itinerary is given with military precision and it gives just such details as are necessary for a marching army. The performance itself was on a bigger scale than the British mission to Lhasa 100 years later; the expedition had greater difficulties to overcome as the distances from the basis were so much longer.

[1] Georgi: Alphabetum Tibetanum p. 333 et seq. Compare Vol. I, p. 264 et seq.

Of the inhabitants on the banks of Murussu the Chinese author says: »Les tribus du Mourous oussou sont à l'est-nord-est du Zzang, et s'étendent jusqu'aux frontières de Si ning. Leur pays confine avec celui des Hor ou Mongols de Dam, et elles sont mêlées avec ceux-ci.»

Here we must remember that in the middle of the 17th century the Khoshot prince Gushi Khan (Couchi Han) and a part of his victorious hordes settled in the district Dam, some 8 days N.E. of Lhasa and not far from Nak-chu.[1] In the following passage we recognize almost word for word what della Penna wrote of this region: »Damna, quæ inter Civitates Sericæ a Ptol. numeratur eadem esse videtur ac Dam, unde nomen accepit Ducatus Dam in hac Provincia situs. Præter ædem Regiam ac Nobilissimam Ducis, nullæ sunt domus. Habitant Populi in tentoriis, partem maximam Tartari, reliqui Tibetani. Dam octiduum distat a Lhassa. Post Dam, biduo pervenis Nak-cihu-kha . . .»[2] The following is a quotation from Huc:

»On nous raconta, qu'à une époque très-reculée, un roi du Koukou-Noor, ayant fait la guerre aux Thibétains, les subjugea en grande partie, et donna le pays de Na-Ptchu aux soldats qu'il avait emmenés avec lui. Quoique ces Tartares soient actuellement fondus dans les peuples thibétains, on peut encore remarquer, parmi les tentes noires, un certain nombre de ïourtes-mongoles. Cet événement peut aussi expliquer l'origine d'une foule d'expressions mongoles, qui sont en usage dans le pays . . .»[3]

The same is still the case as I heard on my journey in 1901.

In all these quotations and although we are so near the Transhimalaya, there is not a word about these mountains. Both the roads to the N.W. and N.E. are shortly described or, at any rate, mentioned and both cross the Transhimalaya. And still the mountains are not mentioned at all. On the map which accompanies Klaproth's translation[4] »Pays de Dam» is situated direct north of Tengri-nor. In our days both the village of Dam and Dam-largen-la are situated south of the same lake. The village of Dam is south of Transhimalaya, but the old Duchy of Dam is north of it. But we have seen before, that Transhimalaya itself is very hard to recognize on this Chinese map. Only that part of it which is situated between the southern shore of Tengri-nor and Chaktak-tsangpo is fairly correct. But this range has no western continuation at all. What is in reality its western part, with M. Gandis, has been placed south of the upper Tsangpo. In the interior of Tibet there are some ranges drawn on the map, and the range south of »Frontière de Yarkiang» is obviously Kwen-lun. In this range we find Keri ye, N.W. of Lhasa. The route from Khotan and Keriya diagonally to Tengri-nor was entered on Chien Lung's map. Dutreuil de Rhins suggests that this road in reality went to Panggong-tso and Noh and thence to Tengri-nor.

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[1] Köppen, op. cit. Band II, p. 153.
[2] Georgi, op. cit., p. 422.
[3] Huc: Souvenirs d'un voyage . . . Tome II, p. 238.
[4] Vol. I, Pl. VI.

A part of Klaproth's »Carte du cours inférieur du Yarou dzangbo tchou», 1828.

Gen. Stab. Lit. Anst. Stockh.

The great Emperor KANG HI knew the geography of his empire very well. After having, in 1720, replaced the Dalai Lama on his throne, the Emperor issued in the beginning of the following year an order in which he gives a remarkable description of the courses of the great Tibetan and Chinese rivers. This was done according to the information he had obtained from the high Lamas of Tibet. The following is what the Emperor wrote: [1]

»Depuis ma jeunesse je me suis occupé de géographie; c'est pourquoi j'ai envoyé des grands au mont Kuen lun et dans le Si fan. Toutes les grandes rivieres, comme le Grand Kiang, le Houang ho, le He choui (rivière noire, en mongol Kara oussou), le Kin cha kiang (rivière à sable d'or) et le Lan thsang kiang, ont leurs sources dans ces pays. Mes envoyés ont tout examiné par leurs propres yeux; ils ont fait des recherches exactes, et ont consigné leurs observations dans une carte. Il en résulte évidemment que toutes les grandes rivières de la Chine sortent du versant sud-est de la grande chaîne du Nomkhoûn oubachi,[2] qui sépare le système hydrographique de l'intérieur, de celui de l'extérieur.

L'origine du Houang ho se trouve en dehors de la frontière de Si ning, à l'est du mont Koul-koun. Des sources innombrables y jaillissent de la terre, et donnent un éclat semblable à celui des étoiles; les Mongols les appellent Odun-tala, les Tubetains Solom, et les Chinois Sing sou haï (mer du séjour des étoiles). C'est la réunion de ces sources qui produit le Houang ho; il forme les lacs Daring et Oring, coule d'abord au sud-est, tourne au nord, puis revient à l'est, passe devant les forts de Kouei te phou et de Tsy chy kouan, et entre (en Chine) par le territoire de Lan tcheou.

Kin cha kiang a sa source dans le nord-est des états de Dalaï-lama, au pied du mont d'Ounie iin oussou (en mongol l'eau de la vache), dont le nom en chinois est Ju nieou chan, ou montagne de la vache. Le courant d'eau qui en sort porte celui de Mourous'oussou, et coule au sud-est dans le pays de Kam (province du Tubet), traverse ensuite la contrée (appelée en chinois) Tchoung tian, entre dans le Yun nan, près du fort de Ta tchhing kouan, et y reçoit le nom de Kin cha kiang . . . Toutes ces rivières sont au sud-est, et en dedans de la grande chaîne du Nomkhoûn oubachi, ont leurs sources dans le Si fan (Tubet oriental) et entrent en Chine.

To this article Klaproth adds a map,[3] which in many respects is admirable for its time, in spite of the unfortunate mistake: Yarou dzangbo-Irrawaddi. It is, however, only the north-western corner of the map that interests us here, between Lhasa and Dangra-yum-tso, and between Dangra-yum-tso and Tsangpo (Pl. II). He has used all the material of BOGLE, TURNER and MANNING. Thus we find the »Pic Tchamatari 26 000 pieds», and at its foot the two lakes, here called L. Ramtchiou (Ram-chu) or Djamdzo (Jam-tso) and L. Gangladzo (Kara-tso). As on Turner's map there is no connecting channel between them and no communication with the river Djouangdze (Gyangtse) or any other river. Yamdok-tso is called »L. Yar brok Yudzo, Yambro, Yumdzo ou Palte».

The course of the R. Chang (Shang-chu) is very like that on the Ta-ch'ing map and on d'Anville, and Namling-dsong is called Dziangamring. But why does

[1] Mémoires relatifs à l'Asie. Par M. J. Klaproth, Paris 1828, Tome III, p. 370.
[2] This is the range which Klaproth identifies with the Temen M. of d'Anville's map.
[3] Carte du cours inférieur du Yarou dzangbo tchou.

Klaproth call the upper part of the river R. Danak boutchou? On the Ta-ch'ing map it is called Daghri phou tchou. It is obviously the same name in both cases. Both the Ta-ch'ing map and Klaproth have mixed two rivers or rather made one river of two. This may be seen already from my preliminary account which runs as follows:[1] »Tanak-puchu is a great valley coming down from the north, and its river irrigates the fields in Tanak. I could not obtain a clear description of this valley: all I heard was that it came from a pass to the north; so I do not know whether it comes from the Transhimalaya, like the Mü-chu and Shang-chu valleys. If such is the case, however, then the eastern watershed of the Mü-chu is a hydrographic boundary between it and the Tanak-puchu, not the Shang-chu. The question can only be solved by future investigations on the spot.»

Of course Klaproth's Danak boutchou and the Ta-ch'ing map's Daghri phou tchou are the same as my Tanak-puchu. The name should be written Tanak-pu-chu, which means »the river of the upper part of the valley of the black horse». For *pu* is the upper part of a valley. The name may also be written Ta-nakpo-chu.[2] My Rung-chu, by which I came down to the Tsangpo in 1907, is obviously the Rong-tchou of the Ta-ch'ing map, where the confluence is correctly situated above the confluence of the Sab-tchou (Shap-chu) and the Tsangpo. On Klaproth's map the Rung-chu is somewhat changed and drawn out considerably longer than on the Chinese map, but it has no name. The situation of the Delden (Terten) and Temple Delden shows, however, that it is the same river in both cases. As the situation of Delden corresponds to Ye-shung it may be either Ganden-gompa or Tugden-gompa. I cannot make out the Kiet-tchou of Klaproth, Kié tchou of the Chinese map. Probably it is some small valley. But the fact that both maps have added the upper part of the Tanak-valley to the Shang-valley or assumed that the Shang river was called Tanak in its upper part, seems to permit us to draw two conclusions, viz. that my above quoted suggestion was correct, namely, that the Tanak-pu-chu comes from a pass in the water-parting range of the Transhimalaya, and secondly that the surveyors of the Ta-ch'ing map have not been up the whole way to Khalamba-la, for if that had been the case, they would have observed that the river came from N.E. and not from N.N.W. And if the Chinese surveyors had really followed the Tanak-valley from its head and down to the Tsangpo, they would have observed that the river joined the Tsangpo and not the Shang river.

The region in which the source of the Tanak river is situated still remains absolutely unknown, for, from a European point of view, the two maps I am discussing cannot be accepted as real or even approximate knowledge. Not even Nain Sing, from his northern route, has been able to see anything in this direction. The map is still left blank. Only my first crossing, over the Sela-la, gave an

[1] »Trans-Himalaya.» Vol. I, p. 286 and map.

[2] Compare Vol. II, p. 296. The name of the village on the left bank of the Tsangpo is Tanak, or generally Tana or Dana.

Tibet on Klaproth's map of Central Asia, 1836.

GEN. STAB. LIT. ANST. STOCKH.

important fixed point for the stretching of the Nien-chen-tang-la torwards the west, and the general situation of the Nien-chen-tang-la between Khalamba-la and Sela-la may now, approximately, be entered on the maps. But until somebody has crossed the range, say at the head of Tanak-pu-chu, this section of the Nien-chen-tang-la will have to be regarded as completely unknown. So much can already now be said, that both the Chinese map and that of Klaproth are quite wrong in these parts. In some particulars, for instance, the reasonable length of the northern tributaries of the Tsangpo, the Chinese map is nearer the truth, in others, for instance, the relative situation of Dangra-yum-tso, Shuru-tso and Amchok-tso, Klaproth's map is the best. We only need to notice that Klaproth has the source of the Shang river very near the eastern shore of Dangra-yum-tso, whereas in reality it is situated not far S.W. of Tengri-nor, 180 miles further east, to realise the confusion in this part.

Further so much is known through three of my crossings, that the continuation of the Nien-chen-tang-la to the west goes between Shuru-tso and Amchok-tso. On Klaproth's map there is a water-parting between Shuru-tso and Amchok-tso, but he places the principal watershed of the Nien-chen-tang-la direct east of Dangra-yum-tso, which, as we have seen, makes the tributaries of the Tsangpo double as long as they ought to be. Only the part of the range which is situated east of the Shang valley is fairly correct on Klaproth's map, as far as we now are able to judge, and disregarding the general deformation of his map. His Tombala corresponds to the Pundit's Khalamba-la.

The best feature on his map is that L. Dangra youmdzo, L. Chourou youmdzo and L. Amtchouk have not only got their correct names, but have also been relatively so well placed. For he has all three lakes on one line, almost north and south, as they are in reality. If this has happened by some lucky intuition or from some source unknown to us is difficult to say. For as far as we know with the exception of natives, no traveller has ever passed this way, and here Klaproth's map is very unlike the Ta-ch'ing map. Klaproth has a river between Shuru-tso and Dangra-yum-tso which does not exist in reality. Amchok-tso has got three rivers, two entering and one issuing which end in a little lake without connection with the Raga-tsangpo. This river is much too short, but correctly called Dok-tchou.

We do not need to search for any more extracts of Klaproth's translations from Chinese geographical works. It will be sufficient to discuss his remarkable map of Central Asia, which was published in Paris 1836 in four sheets and on the scale of 1 : 2 600 000. This map, of which Pl. III shows the part of Tibet which interests us, may be regarded as the result of many years' hard work and as representing the whole store of knowledge possessed by Klaproth in 1836. For while Dutreuil du Rhins' map of Tibet is chiefly built upon the Ta-ch'ing map and the more recent European exploration, Klaproth has made use of all material existing at his time and tried to penetrate the meaning of the several Chinese geographical

works, in which hardly anybody except himself was at home. Klaproth's map was practically the best in existence for some 40 years and all maps of Asia printed in Europe during that time were copied from it. Dutreuil de Rhins' map, on the other hand, had no special geographical importance, only a great interest as a curiosity.

Klaproth's map has the following title: *Carte de l'Asie Centrale dressée d'après les Cartes levées par ordre de l'Empereur Khian Loung, par les Missionaires de Peking, et d'après un grand nombre de notions extraites et traduites de livres chinois par M. Jules Klaproth. Paris 1836.*

We are, already at first sight, struck with the great harmony existing between the orographic and hydrographic systems as shown on this map. The basin of nearly every one of the great rivers is bounded in the most regular way by mountain ranges. Such is the case with the upper Indus, Satlej, Map-chu, Tsangpo, Raga-tsangpo, Targo-tsangpo and others. Here, to a certain extent, it has been sufficient to make use of the most elementary laws of physical geography, but on Klaproth's map the boundary ranges have become too simple; there is always only one single range separating two river systems from each other, as if the water-parting line always coincided with the highest crest of the different ranges. And therefore the orography, as a rule, becomes false, a fact which does not in the least diminish the great merit of the map and the high value it had at the time of its appearence. Many years after Klaproth's time European maps of Tibet were published, the orographical representation of which, for the country north of the Tsangpo, was much further from the truth than Klaproth's map.

There is a great resemblance between d'Anville's and the Ta-ch'ing map on one hand and Klaproth's on the other. But while d'Anville north of the Tsangpo has a great number of ranges, independent of each other, Klaproth has combined the different ranges into one main range, from which several smaller ranges issue in different directions. On the meridian of Katmandu, however, the principal range divides into two, situated north and south of the river Dargou zzang bo tchou or the mysterious Targo-tsangpo.

I will now discuss the principal features of the map so far as it touches upon our regions. The source of the Satlej is shown as situated in Lake Gounghiou at the northern foot of Mount Langtsian kabab ghang ri, and the topography is here nearly the same as on d'Anville, though on all three maps it is difficult to say whether L. Gounghiou or L. Goungha is meant to be the Gunchu-tso. The two famous lakes, Mapham mtso and Lang mtso are taken from Moorcroft, though Klaproth's hydrography is very much improved. He has the channel between both lakes in the right place, and the Tirtapuri Satlej issuing from the western lake.

The sacred mount north of the lakes is drawn rather as a range than a peak, and called M. Tise, Tese Ghang, Ti se ri or Kaïlas'a. A short distance N.E. of its northern slope is the source of the Singdzing Khampa, and in the same neighbourhood we find the M. Sengghe kabab ghang ri. The southern Indus branch is called R.

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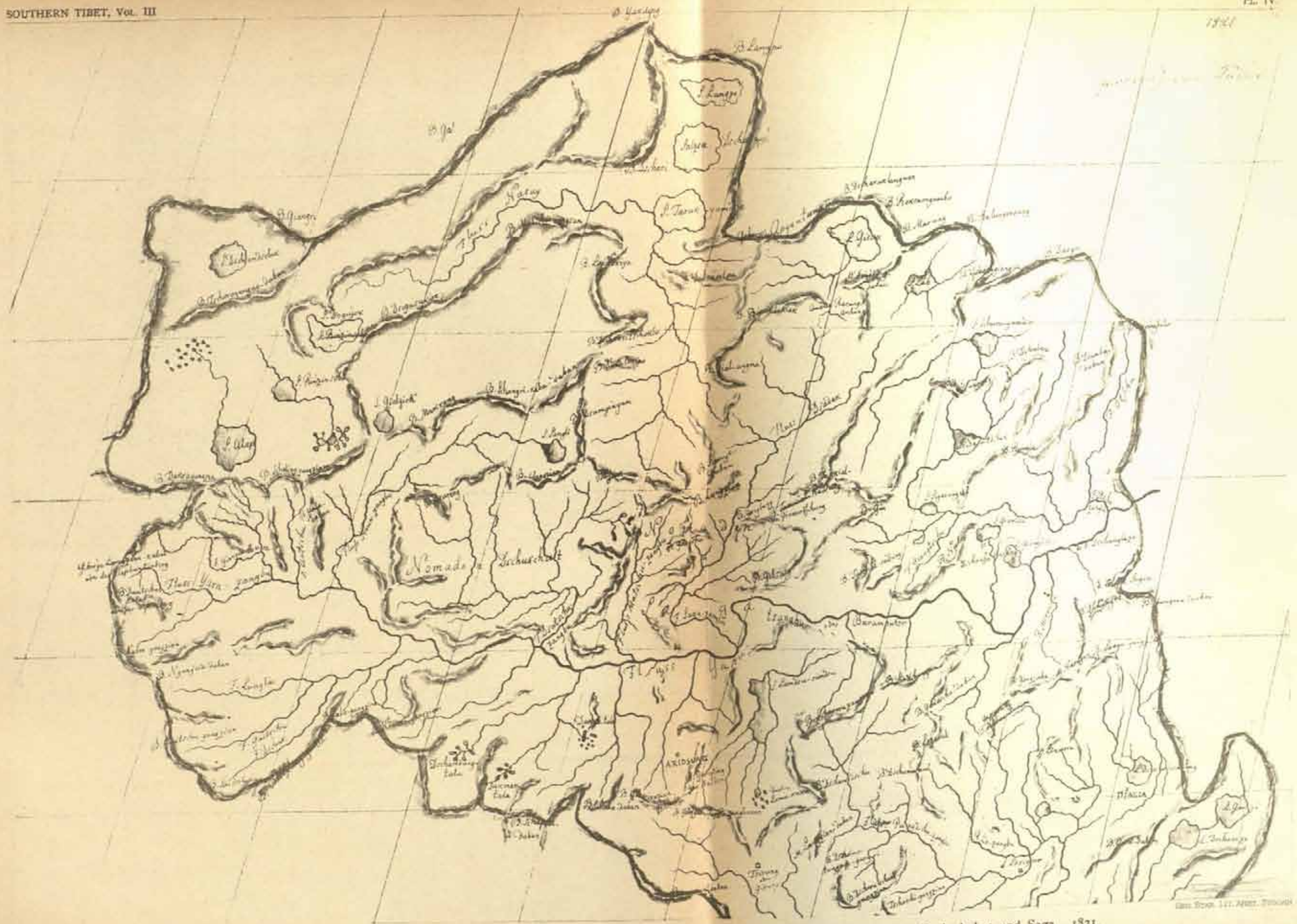
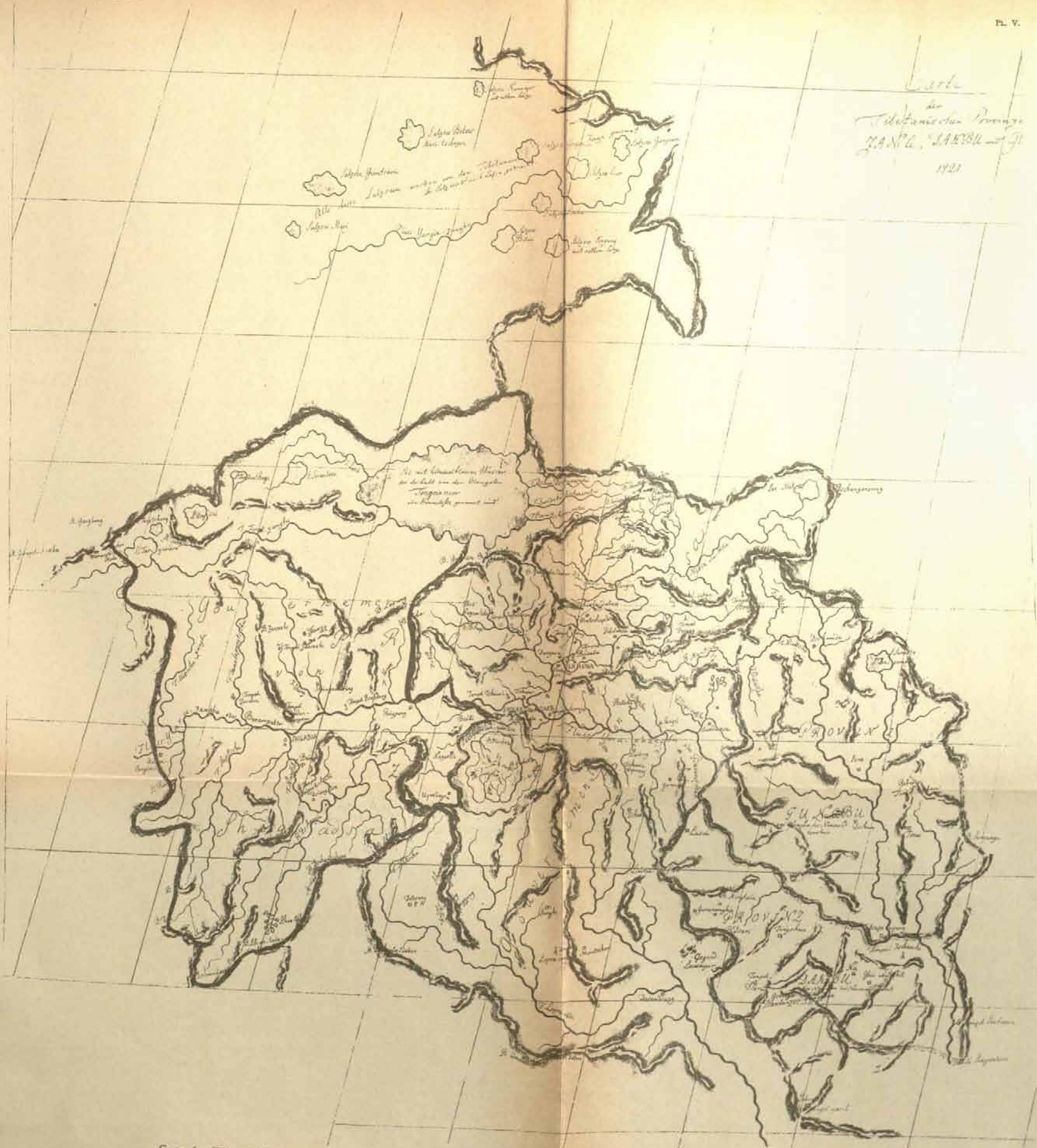


Carte des westlichen Theiles der Provinz Tsang, der Quellen des Yaru-zangbu und der Länder der Nomaden von Dschudschut und Saga. 1821.
(Handzeichnung von Jul. von Klaproth. Massstab cirka 1: 2.000.000).



Carte der Tibetanischen Provinzen Zang, Dakbu und Gungbu. 1821. (Handzeichnung von Jul. von Klaproth. Massstab cirka 1 : 2.000.000).

Ikhang tchou, and on its upper course is Gar, Garo or Gartok. The joint Indus is called Singhe tchou, as is indeed the case.

The source branches of the Brahmaputra are shown exactly as on d'Anville and the Ta-ch'ing map. But Klaproth has, in a very unfortunate way, removed the M. Tamtsiogh kabab ghang to the north from the place it has on d'Anville (Vol. I, Pl. LI). The tributaries of the Tsangpo are exactly the same as on d'Anville and the Ta-ch'ing map. The Djadak tchou, our Chaktak-tsangpo is shown as breaking through a mountain range, which is in reality the case. Further west is the range M. Hlounbo gangri, which is the same as our Lunpo-gangri.

I have already discussed Klaproth's representation of the three lakes Dangra-yum-tso, Shuru-tso and Amchok-tso on his map of 1828 (Pl. II). Comparing this map with the one of 1836 (Pl. III), we find that the former is far superior to the latter, as far as these lakes are concerned. Even the names are much better transcribed on the first map: Dangra youmdzo, Chourou youmdzo and L. Amtchouk. On the latter they are called: Dhwang la you mtso, Dzirou you mtso, and Amtsiogh mtso. In the first case they are shown as situated nearly on the same meridian, as is the case in reality; in the second they form a triangle, the Dangra-yum-tso being placed direct east of Shuru-tso. It is difficult to see for what reason Klaproth has spoilt what he believed was correct in 1828.[1] But probably, as no other material existed he has thought wiser, when publishing his great map of Central Asia in 1836, to adhere to the Chinese hydrography. Therefore Shuru-tso and Dangra-yum-tso are shown as parts of the hydrographical system of Dargou zzang bo tchou and thus belonging to the hydrographical system of Tengri-nor. As I found the Targo-tsangpo comes from the S.E. and flows into the Dangra-yum-tso at its southern shore. The Chinese topographers were certainly never in this part of the Transhimalaya, for otherwise they could not have made such mistakes. But they were in the regions of Tarok-tso, Chaktak-tsangpo, Tsa-chu-tsangpo and Raga-tsangpo for here the main hydrographical lines correspond to reality.

Klaproth's placing of the Niantsin tangla gangri in relation to Tengri-nor is no improvement upon the Chinese maps. For he places this high glacier group at the eastern shore, while in reality, it is nearer the western. But with the exception of the lake, the range of Nien-chen-tang-la is very well drawn on Klaproth's map, far superior to much later maps, for instance Hodgson's of 1857.

Sometimes, as in the case of the last-named range, one feels tempted to believe that Klaproth by pure intuition found the right way in the unknown regions of Asia, and there is much truth in the words with which Abbé Huc finishes the narrative of his famous journey: »Ecrire un Voyage en Chine, après quelques promenades aux factories de Canton et aux environs de Macao, c'est peut-être s'exposer

[1] Pl. IV and Pl. V are reproductions of Klaproth's hand-drawn maps of 1821 which, by the kindness of Professor Meisner at the Royal Library of Berlin, have been put to my disposal. In the map-collection they are signed E 1910 and E 1830.

beaucoup à parler de choses qu'on ne connait pas suffisemment . . . Quoiqu'il soit arrivé au savant orientaliste J. Klaproth de trouver l'Archipel Potocki, sans sortir de son cabinet, il est en général assez difficile de faire des découvertes dans un pays sans y avoir pénétré.»

In later chapters we shall see in how far Klaproth's map has been improved or spoiled by other geographers. Under all circumstances it must be regarded as one of the most important maps of Central Asia which have ever been published.

CHAPTER VII.

DUTREUIL DE RHINS.

On his general map that is the result at which DUTREUIL DE RHINS has arrived by studying both eastern and western sources, this author has preferred not to enter any mountain ranges at all. He has only marked out on his map some prominent peaks, as Nien-chen-tang-la, Targo-gangri and Kailas. But of the few orographical features as shown on his map in the interior of Tibet he says that they are rather hypothetical, »car la plupart n'ont pas été même entrevues par les explorateurs modernes».[1] He says that an altogether hypothetical orography may perhaps be allowed only on an atlas map for giving an approximate idea of the general structure of a country. And he asks: »Sur les cartes d'étude, ne devrait-on pas supprimer tout dessin orographique jusqu'au moment où la cartographie repose sur de véritables levés topographiques?» This sound and conscientious view was expressed many years after the publication of the maps of Hodgson and Saunders, who, disregarding the most elementary rules of accuracy, drew tremendous mountain ranges in regions where no Europeans and no Pundits had ever been.[2]

Still, in his work de Rhins at some places comes into contact with the Trans-himalaya. In the beginning of the Manchu dynasty the Chinese had only very

[1] L'Asie Centrale, Paris 1889, p. 19.

[2] The map is the *pièce de résistance* of de Rhins' work. The text only explains how the map was constructed. From well known points at the periphery he approaches the centre. He has the greatest confidence in the Chinese maps, just as Richthofen. Of de Rhins' view regarding Tibet Dr Georg Wegener says (Petermann's Mitteilungen, 38. Band, 1892, p. 87): »mit Recht weist der Verfasser darauf hin, dass das grössere Verdienst an unseren heutigen Kartenbilde von Tibet noch immer den Chinesen gebührt, denn alle unsre modernen Reisen zusammengenommen, würden noch nicht im Stande sein, ein annähernd so vollständiges, organisches Gemälde zu liefern, wie es die Chinesische Geographie, von aller Hypothese frei, uns giebt.» This was true in 1892, but not now after the important journeys during the last 20 years. His intention has been to use all existing material and to get a reliable foundation for geographical co-ordinates on which in the future could be further built upon. His book is admirable for the immense amount of work it contains and for its great erudition, but Wegener thinks the author must have suspected that nobody would ever read it through. His interpretation often seems conjectural and speculative. The way in which de Rhins translates the »li» is not certain and his distances therefore often unreliable. Regarding the author's not using German geographical works Wegener is perfectly right in saying: »Er hat also ein Lebenswerk über Zentralasien geschrieben, ohne die bei weitem hervorragendsten zeitgenössischen Untersuchungen darüber zu kennen.» Thus he had not the slightest idea of the modern physico-geographical and geological views on Central Asia, which would have been of great assistance to his map.

approximate and unreliable maps of those parts of Central Asia, which are situated south of the Tarim. In 1708, the Jesuit missionaries began their great work of correcting the old maps of Tibet and Tartary. For Tibet both the Jesuits and d'Anville used chiefly native information, as except this they had only a few positions given by Grueber and Dorville, and some information gathered by the Capuchins.

Emperor Chien Lung ordered an Imperial Geography over his whole empire to be written, known as the *Ta-ch'ing-i-t'ung-chih*, and first published in the year 1744. It is accompanied by the *Ta-ch'ing Atlas* of the Jesuits. From this work Amiot and Klaproth have made their translations.

Then, after several years, Turner draws a real map of the part of the country he has seen, and de Rhins regards him as the man who inaugurates the modern era of exploration.

In some of the Chinese quotations in de Rhins' book we get here and there a glimpse of Transhimalaya and chiefly of the parts situated north of Ngari and Manasarovar. Thus:[1] »Le Djedabouri — une des plus grandes montagnes de neige de la province de Ari — est contigu à la précédente et s'étend à 240 li (53 milles) au nord-est de Goughé djachi loumbo. Au nord-est des chaines précédentes se trouvent les Gang ri (grandes chaines neigeuses). Les Gang ri commencent à 380 li (84 milles) dans le sud-est de Rudok, forment la Limite orientale de la province de Ngari et se continuent à l'est dans le pays des Katsi.»[2] To which de Rhins adds: »Les montagnes précédentes limitent à l'est et au sud-est le bassin de l'Indus. Le massif du Djedabou ri, du Senghé khabab et du Gang dis ri, se prolonge au sud-est en limitant au nord les sources du Tsan po», a view which, although hypothetical, is nearly correct. The Chinese text mentions the following peaks as being the highest of this chain: »Le Dziabrié dziarbou dangni rong ri, dont la hauteur égale presque celle du Gang dis ri, et les Chang gou yarak marak ri, à 280 li (62 milles) au nord-ouest des Djochot, hautes montagnes neigeuses dont les contreforts méridionaux sont le Chadziar, le Lounggar et le Rong mar qui limite au sud le Dzolmié thang en se rattachant aux monts Takra long (Mouran).»

To this, again, de Rhins adds: »Résumant les données orographiques précédentes on voit qu'au nord de l'Indus et du Tsan-po, qui sont dans le prolongement l'un de l'autre entre le Ladak et les Djochot, deux chaînes principales et parallèles s'allongent dans la même direction (du nord-ouest au sud-est).»

With our present knowledge it is impossible to identify the mountains mentioned here. As they are said to be situated N.W. of Djochot, they seem to rise S.E. of my route from Nganglaring-tso to Tokchen and probably belong to the range to which I have given the same name as the pass Ding-la, a range which is the highest in this part of Transhimalaya. Lounggar sounds very like Lunkar,

[1] Op cit. p. 520.

[2] Pl. VI is a reproduction of Dutreuil de Rhins' Carte N:o 21: Thibet Sud-Occidental, première transformation de la carte chinoise.

which, however, is further east, south of Tarok-tso. Should Dzolmié thang be identical with Nganglaring-tso and the wide plain (tang) surrounding it? Takra long indeed corresponds to d'Anville's M. Mouron. But I become lost in guesswork and do not find a single fixed starting point. The conclusion drawn by de Rhins seems, generally speaking, to be fairly correct, in case the two really existing ranges of Ding-la and Surnge-la are meant. For, further east the orography becomes more complicated. De Rhins personally expresses the following view: »La plus éloignée des deux fleuves est la chaîne des Gang ri située dans le prolongement des Tsong ling ou monts Karakorum; à la plus rapprochée, dont fait partie le Gang dis ri, on peut avec quelque raison appliquer le nom du sommet principal.» This is not quite clear. The one of the two ranges situated at the greater distance from the rivers should be the Gang ri and to the one situated nearest the rivers he suggests the name of Gang dis ri. But so far as I understand, the name Gangri has been proposed earlier for the range to which Kailas belongs. Whether the Tsong-ling is identical with the Kara-korum mountains and whether the range Gang ri is the continuation of the Kara-korum, these are questions which had already been opened by Klaproth and to which we shall have to return later on.

The following passage is interesting:[1] »Les Chinois prétendent qu'il y a une douzaine de chaînes parallèles à celles-ci au nord-est de l'Indus et du Tsan po; mais leurs textes et cartes ne donnant pas d'autres renseignements que ceux que nous reproduisons, il est impossible d'en trouver plus de quatre dans les limites du Thibet: les deux que nous venons d'indiquer et deux autres dans la région nord-occidentale que nous étudierons plus tard.»

The two ranges mentioned before are thus the Gangri and Gang dis ri, of which the latter was known to Moorcroft and both crossed by the Pundits of 1867. But what did the Chinese mean in pretending that a dozen other chains should be situated N.E. of the Indus and Tsangpo, all parallel with the Gangri and Gang dis ri? De Rhins could find only two, and two others in the N.W. From the Chinese text he could not find out a single range N.E. of the upper Indus and Tsangpo except the two mentioned. It may be that the Chinese author means, amongst others, some of the ranges which it was my good fortune to discover north and N.E. of the upper Tsangpo, the existence of which was unknown even to such western scholars as had made a special study of the Chinese texts. And de Rhins also points out that neither the Chinese texts nor their maps have anything to say about this dozen of chains.

Du Halde says that the Chinese called the whole chain to the *west* of Kentaisse Kan te chan, or at least the Lama surveyors were told so in the temple where they stayed to gather information about the further course of the Ganges.[2]

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[1] Ibidem, p. 521.
[2] Description de l'Empire de la Chine etc. Tome IV, p. 465.

From the Chinese text de Rhins mentions the following principal peaks as situated between the lake Lang-tso (Rakas-tal) and the sources of the Tsangpo:

»Le Mabghia khabab gang ri, à 140 li ou 31 milles au nord de Tak la kar, sur le flanc méridional duquel naît le Ma tchou ou Karnali. Le Manak nil gang ri, contigu au précédent vers le nord-est, est à 250 li ou 55 milles au nord-est de Tak la kar. Le Lang tsian khabab gang ri, à 250 li ou 55 milles nord-est de Tak la kar; le Lang tchou y prend sa source.»[1]

Du Rhins adds:

»Les monts Maryoung relient la chaîne du Gang dis ri à la chaîne Samtai gang ri. Celle-ci se prolonge au sud-est (monts Tam tchouk kouben gang tsian, etc.) et constitue la ligne de partage entre les bassins du Gange et du Tsan po . . .»

I have shown above that the mountains of Maryum cannot be said to be the threshold between the parallel ranges north and south of the principal latitudinal valley. They should rather be regarded as ordinary ramifications from both sides.

In his chapter XXX[2] de Rhins comes to the part of Tibet which is situated north of the Tsangpo, and he says: »Malheureusement, aucune des traductions d'ouvrages chinois cités dans la bibliographie ne contient d'itinéraires dans cette région; et on est obligé de se contenter des extraits traduits du Tai thsing i Tong tché ou de la géographie chinoise, extraits tellement vagues et incomplets qu'on ne peut, en les rapprochant, en les groupant de toutes les façons, réunir les éléments nécessaires à la détermination précise d'un seul point.» It is a curious coincidence that the part of Tibet, for which de Rhins has not been able to find a single reliable point, is exactly the same which I crossed in several directions and where I visited, amongst many other lakes, the Tarok-tso. Of the river Tarogh de Rhins says: »Ainsi, on n'y trouve même pas un mot sur la rivière Tarogh. Cependant, cette rivière et ses affluents sont tracés avec de tels détails sur la carte chinoise qu'on peut affirmer qu'ils ont été levés au moins à l'estime, et qu'ils ont dû être l'objet de rapports ou de récits qui ont été publiés, soit dans le Tai thsing i Tong tché, soit dans d'autres ouvrages chinois non traduits ou traduits partiellement.»

The lake Tarok-tso is described thus: »Le Tarogh mtso ou Tarouk you mtso est à 550 li (121 milles) au nord-est de la horde des Djeba.[3] Il a 280 li (environ 60 milles) de circuit. Il reçoit du côté de l'ouest la rivière Naghii choung qui s'y jette après un cours de cinq journées; et au sud il reçoit les eaux de plus de dix

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[1] All these names are also to be found on Klaproth's map, Pl. III.

[2] Op. cit. p. 535.

[3] Klaproth translates this passage thus: Le Darok you mthso, ou le lac des chevaux jaunes et des turquoises. Il a reçu ce nom, parce que ses eaux ont la couleur de la turquoise, et les rochers qui l'entourent ressemblent de loin à des chevaux jaunes. Il est à 550 li au nord-est des nomades de Djeba, dans la province de Dzang; il a 280 li de circonférence. Du côté de l'occident, il reçoit la rivière Naghïï choung tchou, qui s'y jette après un cours de cinq journées. Du côté du sud, il reçoit plus de dix rivières qui sortent des montagnes, et se réunissent en une seule. — Magasin Asiatique, Tome II, N:o IV. Paris 1828, p. 287. Compare also: Amiot in Mémoires concernant l'Histoire etc. des Chinois, Tome quatorzieme, Paris 1789, p. 205.

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rivières qui sortent des montagnes et se réunissent en une seule. La horde des Djeba est à 420 li (92 milles) dans l'ouest de Chigatzé, près du Amtchok mtso situé à 180 li (40 milles) au nord-ouest de Djang abring.»

The latitude of Tarok-tso is fairly correct on the Chinese map, but it is placed more than one degree too far east. The river Tarogh of which de Rhins speaks is obviously the same which, on the map, is called Rong pou, and as I found it, Buptsang-tsangpo. On the Chinese map it flows from south to north, in reality from S.E. to N.W. There is a Mt. Samoié on the map, which may be identical with the Samye-la, although it is not at all within the drainage area of the Buptsang-tsangpo as represented on the Chinese map.[1] The principal thing is, however, that a river entered the lake from the south and de Rhins is right in supposing that it has been roughly surveyed. Under such circumstances the existence of the river Naghii choung tchou coming in from the west must also be regarded as beyond doubt, even if its length is greatly exaggerated in the Chinese text. But this river flows through a part of Tibet where no European and no Pundit has ever been. When the text says that Tarok-tso is N.E. of Amchok-tso, this must be a misprint, for on the map the direction is N.W. as it ought to be.

Another proof that this region has really been visited and surveyed may be found in the following passage: »A 20 li (4 milles 5), au nord du Tarogh, se trouve le Djabjaya tchagan dabsoun nor ou Tchapia tsaka, qui a 150 li (33 milles) de circuit, et sur les bords duquel les indigènes receuillent du sel blanc.»[2] For such a salt basin, the insignificant rest of a former lake, really exists and is called Tabie-tsaka. It is still the place from which the Tibetans get their best salt. It is interesting to observe that just the Tarok-tso and its southern river, and the Tabie-tsaka should be mentioned in the Chinese text and much more correctly entered on the map than any other part of the country north of the Tsangpo. This must depend on the fact that Tabie-tsaka is such an important centre for the salt trade. Many roads meet here from all corners of the compass, and on account of its importance the Chinese surveyors may have paid greater attention to the place.

D'Anville has Tarouc-yomdsou. The southern river, which is nameless on his map, flows N.N.E. In this respect his map is, as usual, not as good as the Ta-ch'ing map. He has, however, given Samia M. a better situation. The western river he calls Nacoi R. and has it exactly like the one on the Ta-ch'ing map. Tabie-tsaka he calls Tchapie dsake ton psou. North of Tabie-tsaka he has a lake

[1] On Klaproth's map it is called Amyé la.

[2] In Klaproth's translation: Le Djabdjaya tschaghan dabsoun noor, ou le lac du sel blanc du bois madré, est à 20 li de distance au nord du précédent, à 150 li de circonference, et produit sur ses bords du sel blanc dont se servent les habitants du voisinage. — Ibidem. To this Amiot adds: Auprès de ce lac, du côté du nord, il y en a un autre, qu'on appelle Lang pou-tché, dont l'étendue est de deux cens vingt lys. Op. cit., p. 206. This lake is to be found north of Tabie-tsaka, both on the Ta-ch'ing and the d'Anville maps. There is no doubt about its existence as the two southern lakes, Tabie-tsaka, and Tarok-tso, have been proved, on my journey 1908, to exist.

Lanc pou L., which on the Chinese map is called Langbou and placed at the southern foot of Mt Lang bou ri. But this lake and mountain are situated in a part of the country which is north of my routes.

Excepting the northern tributaries of the Tsangpo, spoken of above,[1] the rest of the country north of the Tsangpo is a great confusion where it is difficult to make any identifications, and where, if this is possible, the Chinese representation has not the least resemblance to the reality. This is particularly the case with the western basin of Tengri-nor and with the course of Tarkou tchou of which I have spoken in connection with Klaproth's map. Here, indeed, a river enters the lake and we shall return to it later on. But it is a small river. On the Chinese map it is the largest of all north of the Tsangpo. The Pundits have crossed it near its entrance in the lake. So has LITTLEDALE and Count DE LESDAIN. Dutreuil de Rhins and Grenard were not far from it. But nobody has followed its course and nobody knows from where it comes. And still it is easy to see that the Chinese map here has caused a great confusion, where it is even impossible to tell how such mistakes could be committed. The Chinese text says:[2]

»Le Tengri nor, le plus grand lac du Thibet proprement dit, est situé à 220 li (48 milles) au nord-ouest de Lhassa. Il a 600 li (132 milles) de largeur, environ 1 000 li (220 milles) de circonférence; et il s'étend surtout dans le sens est et ouest. — Il reçoit, à l'est, les trois rivières nommées, en mongol, Djakhasoutaï ou les poissonneuses, et à l'ouest, le Lou sa gol ou rivière Sirkalosse et le Tarkou tsang po tchou qui a un cours de plusieurs centaines de li. Au nord de cette rivière s'étend, sur une longueur de 100 li (22 milles), la chaîne du Tarkou ri qui est couronnée de sept pics très hauts et escarpés. La source du Tarkou tchou est la rivière Po tchou qui sort des montagnes au nord-ouest de Chigatzé, coule à l'est et forme le lac Chourou you mtso. En sortant de ce lac, elle prend le nom de Tarkou tchou, forme le lac Tang la et suit la même direction jusqu'au Tengri-nor.»

One remarks the uncertainty of this description if compared with those of other rivers. The Po tchou begins from a pass situated as it were in the principal water-parting range of the Transhimalaya. Then it flows to Chourou you mtso, leaves the lake under the name of Tarkou tchou and continues to the east, entering a second lake called Tangla mtso, from where it has a long way straight eastwards to Tengri-nor. Now this lake, Tangla mtso, is meant to be Dangra-tso or Dangra-yum-tso. We have seen that Klaproth on his map had a river, Targo-tsangpo, connecting the Shuru-tso and Dangra-yum-tso, and he goes so far as to connect the last-mentioned with Tengri-nor. The whole representation reminds us of the extraordinary hydrographical system which Nain Sing constructed west of Chargut-tso in parts of Tibet where he had never been.

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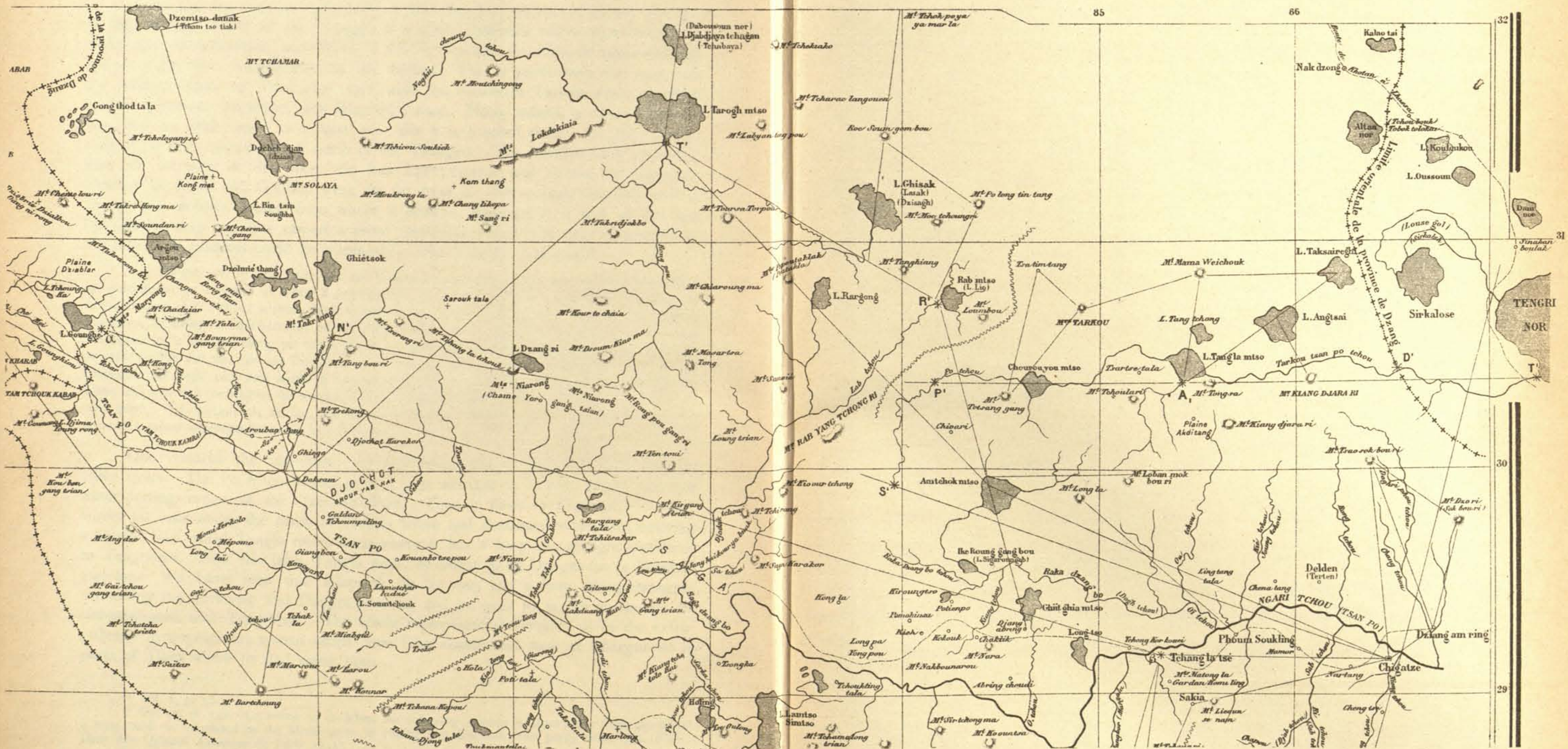
[1] Vol. I, p. 96.

[2] Op. cit. p. 548. According to de Rhins the following passage is taken partly from Tai Thsin i tong tché as translated by the Missionaries in Peking and Klaproth, and partly from Tai Thsing Hoei tien (Journal Asiatique de Paris 1834).



»Carte N:o 21» of de Rhins' Atlas.

Gen. Stab. Lit. Anst. Stockh.

The situation is not improved by the statement that north of this river, Tarkou tsang po tchou, and consequently north of the Dangra-yum-tso, is situated a range of mountains, Tarkou ri, crowned by seven peaks, very high and steep, and 100 li long. This mountain which, as far as the length and the peaks are concerned, is rather well drawn is of course identical with the Targot La discovered by Nain Sing, who passed a considerable distance north of it, whereas I camped at the foot of the mountain. On the Chinese map (always *Première transformation de la carte chinoise* of de Rhins, our Pl. VI) Mts Tarkou are placed N.W. of Dangra-yum-tso, although they are situated at the southern shore of the same lake.

It is not to be wondered at that de Rhins has been puzzled by this labyrinth of lakes, rivers and mountains. In vain he has tried to find some points for comparison from Nain Sing's map, such as Tchok ba ya mar, Roc soum, Mok tchoung, Polong tin tang or other mountains entered on the Chinese map. And he says: »Toutefois, bien que la chaîne du Targot la signalée par Nain Sing, dans le sud du lac Dangra you mtso ne soit pas un point déterminé pouvant servir de point de repère, cette indication concorde d'une façon générale avec la position approchée de la chaîne à laquelle appartiennent le Roc soum, le Mok tchoung et le Polong tin tang.»

It is hard to see how Targot La can agree with the imaginary Chinese range to which belong the three last-mentioned peaks. De Rhins suggests the existence of a range stretching N.W.—S.E. in a region where no such range is known to exist. He believes that mount Tarkou is the highest massive on the range north of Tarkou tchou. And in spite of the difficulties he accepts the Chinese description with the following words:

»Le texte ne précise pas la longueur du Tarkou tchou; mais son importance nous est signalée par l'épithète du 'Tan po' et les 'centaines de li' qu'il parcourt. Les détails du texte et le tracé de la rivière sur la carte 22 sont tels qu'on ne saurait mettre en doute son existence et en supprimer l'indication, comme l'ont fait quelques cartographes. — Même en admettant les distances exagérées du tracé chinois par rapport au Tengri nor, on ne saurait ni identifier les lacs Tang la et Tang tchoung du bassin du Tarkou tchou aux lacs de mêmes noms (Dangra et Tang djong) qui se trouvent sur l'itinéraire du second voyage de Nain Singh par environ 84° de longitude, ni s'appuyer sur cette fausse identification des noms pour supprimer le tracé du Tarkou tchou et des lacs qu'il traverse.»

It is surprising that de Rhins could make such a mistake as to call this identification false. It would indeed be a curious coincidence if a small Tang tchong lake were situated a short distance north of Tangla mtso, as on the Chinese map, and a small Tang Jung Cho at the same short distance north of the Dangra Yum Cho, as on Nain Sing's map. De Rhins reminds us of the hypothetical river Hota Sangpo of Nain Sing, entering Kyaring-tso. If this river existed, he says, as the Pundit has drawn it, it should occupy the territory where, according to the Chinese map, the Tarkou tchou is situated. And he does not in the least hesitate as to which of the two authorities he shall give the greatest confidence. »La carte chinoise

n'indique surtout *que ce qui a été réellement vu;* et les traductions, malheureusement bien incomplètes, de la géographie chinoise révèlent un travail non moins consciencieux où tout ce qui est douteux est signalé.» He accepts the Chinese text and he is persuaded that the Ta-ch'ing map has given the Tarkou tchou as really, although roughly, surveyed. And he adds: »il est impossible d'admettre l'exactitude du renseignement donné à Nain Singh et de faire du Hota tsan po ou du Tarkou tchou un affluent du Kyaring tso». If such a river as the Hota Sangpo exists at all, it must be, he says, situated further north and nearer Nain Sing's itinerary than the Pundit believed.

We learn from this discussion that de Rhins had greater confidence in the Chinese geographers than in the Pundits sent out from India, and in this view he is generally perfectly correct.[1] We have seen an example when comparing Nain Sing's description with that of the *Ta-ch'ing-i-t'ung-chih*. But in the present case, regarding the Hota Sangpo and the Tarkou tchou the situation is different. For there both parts are absolutely wrong. On my crossing in 1907 from Ngangtse-tso to Ye on the Tsangpo, I proved that neither Doba Doba Cho and its river, nor Hota Sangpo existed at all in this region. And if the Ta-ch'ing map had been right I should have crossed the Tarkou tchou instead. But there was no sign of such a river either. So in this case the Chinese map is not a bit better than Nain Sing's, it is even incomparably worse, for Nain Sing's map, along his route and so far as he could see, is very good and reliable, but on the Chinese map there is not even a shade of likeness with the reality. It is all fantasy. No surveyor ever seems to have put his foot in the country. Those who may have been in the neighbourhood seem to have crossed Bongba somewhere, perhaps along the Buptsang-tsangpo down to Tarok-tso and Tabie-tsaka. But as far as the country east and west of Buptsang-tsangpo is concerned they contented themselves with asking questions and then they have tried to arrange on their map the information they got from the natives.[2]

[1] Compare Colonel Gore's experiences told after Ryder's paper: »But for the few (Pundits) that the Geographical Society knows of, there have been many who have been hopeless failures.» Colonel Gore gives two examples of simple fraud. Geographical Journal Vol. XXVI, 1905, p. 394.

[2] I have spoken above (Vol. I, p. 264 et seq.) of the Lama surveyors and their work. The new map which was drawn from their information, was delivered to the Emperor in 1717. Amiot has the following communication concerning what seems to be another exploring mission despatched by Emperor Kang Hi:

La cinquante-sixième année de Kang-hi (1717), l'Empereur voulant se procurer des connoissances sur le Thibet, plus exactes que celles qu'on avoit eues jusqu'alors, envoya de Péking des Géographes de sa nation, à la tête desquels il mit un homme Cheng-tchou, Mandarin dans le Tribunal des Affaires etrangeres, pour leur procurer sur la route tous les secours dont ils pourroient avoir besoin; & nomma deux Lama pour leur assurer la tranquillité, & la liberté de faire leurs opérations dans des pays où l'on est plein de respect pour ces Prêtres de Fo. Ces Géographes eurent ordre de mesurer la hauteur des montagnes, & de déterminer la véritable position du Thibet, des côtes du Si-hai, & de tout ce qu'on appelle le Si-tsang. Ils s'acquitterent de leur commission; & en remettant au Tribunal qui est chargé du dépôt des cartes, celles qu'ils avoient dressées des lieux que je viens de nommer, ils en donnerent par ecrit une explication fort ample, dont on trouve un abrégé, corrigé depuis sur les observations des Lama, dans le nouvel Y-toung-tché. — Mémoires concernant l'Histoire, etc. des Chinois. Tome quatorzième, Paris 1789, p. 154, 155. The same information is given by Klaproth, though not so detailed. Magazin Asiatique, Tome II, N° IV, Paris 1828, p. 235.

The curious part is that on the ground where the inventors of Hota Sangpo and Tarkou tchou placed their rivers, one of the highest mountain-systems in the world is really situated, namely Transhimalaya. When Dutreuil de Rhins without hesitation accepted the representation of the Ta-ch'ing map, and when Capt. (now Colonel Sir) H. TROTTER with some hesitation, i. e. with dotted lines, accepted Nain Sing's rivers, they gave us excellent examples of the standpoint of European knowledge regarding the existence of Transhimalaya! Whilst some geographers constructed tremendous mountain ranges north of the Tsangpo, others defended the existence of large rivers at nearly the same place.

Of greater value are the following facts related in the Chinese geography: «Le mont Samtan gang tsa est à 180 li (40 milles) au nord de Poumdo; le Largan la à 140 li (30 milles), le Nian tsian tang ra à 130 li (28 milles) et le Tengri nor à 220 li (48 milles) dans le nord-ouest de la même ville . . .» All these mountains were seen by Nain Sing on his journey in 1873—74, and he calls them Sámdán Kángjáng, Dam Lhargan Pass and Ninjinthanglá.

Even on such a recent edition of *Stieler's Hand-Atlas* as 1901, the problematic road from Khotan to Lhasa is entered.[1] It goes from Khotan to Polu, crosses the Kwen-lun-mountains, passes Ilitsi, Aritau-tun, Atan-gol, Suget, Imam-Mula, south of the mountain-range Schatu-tu-daban, continues, always S.E. to Sari, follows the northern shore of Chargut-tso to Nakdzong and finally continues to the western shore of Tengri-nor. The latter part of this road is entered on the Ta-ch'ing map as given by de Rhins, and called »Route de Khotan à Lhassa». It passes five lakes with Mongolian names and one place, Nak dzong. If this is meant to be the province of Naktsang, the journey over high, uninhabited plateaus has become considerably shorter, for, from the beginning of Naktsang to Lhasa, the travellers from Khotan should come into contact with nomads the whole way. But it is difficult to reconcile the northern part of the road with the following description as quoted by de Rhins from the *Si yu tou tché or Orography of Chinese Turkestan:*[2]

»Les ramifications des Tsong ling se dirigent vers le sud-est et constituent les Nan chan ou montagnes méridionales qui commencent au sud-est du territoire de Khotan. En allant vers le sud-est, on rencontre les monts Chatou tou daba dont la chaîne est enclavée dans le désert de sables. — A partir des hameaux situés sur les montagnes de la frontière orientale du Khotan, la chaîne du Chatou tou se dirige vers l'est, traverse le Yechil nor (le district du), puis le désert de sables sur l'espace de 600 li. Les pics se succèdent sans interruption jusqu'à l'extrémité septentrionale du Chatou tou.»

From such vague and uncertain information we cannot suggest the course of this road. De Rhins has tried to reconstruct the whole road between Khotan and Lhasa as given on the Chinese map, but he has not had sufficient dates at his disposal.

De Rhins' examination of the Chinese sources leads him to the general conclusion that it is preferable to omit all ranges and chains from his maps, »comme

[1] Compare Vol. I, p. 264, and Vol. III, p. 38.
[2] Op. cit. p. 560.

étant encore beaucoup trop hypothétiques». He says d'Anville and Klaproth preferred to write down the names instead of fixing the position of mountains from the Chinese documents. De Rhins' own map represents several degrees of difference from the maps of d'Anville and Klaproth and their situation as compared with each other is quite different. Klaproth placed the ranges along the meridians and latitudes and when Humboldt used this material he came to a very uncertain result of geometrical regularity and great simplicity which did not agree with nature.

By Himalaya de Rhins understands the whole mass of mountains which, without forming an uninterrupted series, rises north of India on a line nearly parallel with the course of the Indus and the Tsangpo; »mais nous rendrons son nom de 'Plateau de l'Himalaya' au gigantesque massif qui constitue l'important relief méridional de l'Asie, entre l'Afghanistan et le Sé tchouan».[1] He points out that the natives, Chinese, Manchus, Mongols, eastern Turks, Tibetans and Hindus, from whichever side one approaches, call these mountains »montagnes de neige ou Himalaya». And therefore: »les monts Himalaya proprement dits ne sont donc que les premières assises sud-occidentales ou l'une des nombreuses chaînes du plateau de l'Himalaya».

Further he says: »Pour faciliter l'exposé de nos hypothèses orographiques, car nous ne saurions donner un autre nom à une généralisation succincte et naturellement fictive, nous distinguerons encore les principales lignes de relief du sol, dont les directions sont encore très hypothétiques, vu le petit nombre d'altitudes que l'on possède, puis les lignes de partage des bassins et les veritables chaînes de montagnes.»

De Rhins here calls his own generalisation »naturally fictitious», and still he had used all material, eastern and western, *inclusive* of that of the Pundits, existing until 1889. He does not, of course, allude to Transhimalaya. He means all the ranges of High Asia all of which were known only in their peripheral regions. With the expression »plateau de l'Himalaya ou le relief méridional» he understands the southern highlands of Tibet. He says that the most general direction of the ranges in the interior of Tibet are N.W.—S.E. and S.W.—N.E. and further:

»L'application de cette loi empirique à la direction générale des montagnes dans les régions à peu près inconnues de nord-ouest confirme absolument la théorie orographique chinoise d'après laquelle, au nord des monts Himalaya proprement dits, les chaînes de montagnes ont une direction NO—SE parallèle au cours supérieure de l'Indus; elle confirme l'existence des chaînes ou des rameaux septentrionaux du Chatou tou ling et du Naochidar ling, se prolongeant à travers la dépression du Gobi jusqu'au Tarim.»

So far as the ranges north and south of the upper Indus are concerned the Chinese view is of course correct. For Transhimalaya it is correct only in its western half; the ranges further east generally stretch west—east, and still further east as Nien-chen-tang-la S.W. to N.E., east and S.E.

[1] Op. cit. p. 583.

Asie Centrale par J. L. Dutreuil de Rhins, 1889.

De Rhins carries his law too far when he prolongs to the S.S.E. the range Chatou tou ling and joins it with the Sam tan gang dza, or Samdan Kangjang of Nain Sing, and further with the ranges which form the western watershed of the Irravaddi. Such a general direction, which, as we have seen, de Rhins himself regards as entirely fictitious, does not at all exist in the interior of the plateau-land. The general orographical structure north of Transhimalaya is as a rule more regular and less complicated than we should have expected. But the Transhimalaya is more complicated than the extremely simple, almost childish ranges constructed by geographical fiction.

In his work de Rhins mentions all the names of mountains to be found in the Chinese texts and maps. He mentions Nien-chen-tang-la and Koïran, the latter called Sang dzian sang tchoung on the Chinese maps. But there is nothing about a great general system corresponding to my Transhimalaya. Regarding his great map of Tibet, where he has accepted the Chinese representation of the Buptsang-tsangpo and Chaktak-tsangpo and even the non-existing Tarkou dzang bo tchou, one understands that he could hardly think of a great mountain system here. Even the principal water-parting becomes a most irregular and unlikely line in and out. De Rhins knows all the British publications of Tibet, but in connection with the mountains north of the Tsangpo he never even mentions the names of Hodgson, Saunders and Markham. He only uses texts founded on autoptic observation. As he calls certain parts of his own work of complicated transformation fictitious, he could not possibly use works which are not and cannot be anything but fiction.

Pl. VII is a reproduction of the Transhimalayan part of de Rhins' great map with the title *Asie Centrale par J. L. Dutreuil de Rhins.* This map is in itself an excellent piece of work, though its topography was rarely accepted on later maps of Central Asia. De Rhins here tries to reconcile Chinese geography with the discoveries of the Pundits, chiefly Nain Sing. Other European geographers preferred to abolish all the Chinese discoveries and to leave those regions blank where European travellers and Pundits had never been. In some points de Rhins' method leads to the result that certain mountains, lakes and rivers are represented twice on the map. Thus for instance we have the Dangra you mtso of Nain sing and the Tang la you mtso of the Ta-ch'ing map, though both are one and the same lake. The Chinese Chourou mtso is probably the same as Nain Sing's Siro tso, if the latter is identical with my Shuru-tso. Targo-gangri and Targo-tsangpo are also shown twice. De Rhins' method is therefore of great interest as it shows us how tremendous the difference is between the Chinese and Pundit maps and how great the errors of the former were.

CHAPTER VIII.

KARL HIMLY.

In the preceding chapters I have twice mentioned the mysterious road which, according to Chinese sources, in a comparatively late time joined Lhasa with Keriya and Khotan, thus crossing the most extensive and elevated highland in the world. In the *Wei-Tsang-t'u-chih* it is said that this road proceeds from Lhasa north-westwards through Nak-tsang, passes the mountain of Keriye-la and further through the desert of Gobi to Yarkiang (Yarkand). The whole region is said to be full of sand and stones; there is neither water nor vegetation. The natives call the region Gobi and Ola, or desert and mountains.

Quoting Dutreuil de Rhins' discussion of the Ta-ch'ing map we again return to this extraordinary road, of which Professor GEORG WEGENER tells us that it was opened by Emperor CHIEN LUNG as a trade road from Lhasa *viâ* Tengri-nor to Polu, Keriya and Khotan.[1]

KARL HIMLY gives us some information about this road, taken from a Chinese author, Sü Sung Sing Po who in the year 1817 had visited Ili and published his work in 1824.[2] His description starts from the rivers and enumerates the places situated near them; he also deals with the history of the country. The work consists of five parts, each one with a map. In the introduction he describes the mountains situated between the sacred lakes of Tibet and Tian-shan, as well as the Hwangho and its supposed source branch the Tarim. Then follows the description of the Kashgar-darya, which is said to be formed by two branches, the Ulan-ussu or Kysyl-su and the Yaman-Yart-river. The joint river is called Thsung-Ling-Pei-ho or Northern Thsung-Ling River, after the Kysyl-Yart range or Burrard's Kashgar Range, which in Chinese is called Thsung-Ling. The next river of the work is Yarkand-darya which, together with Tisnâf, is called Thsung-Ling-Nan-ho or the Southern Thsung-Ling River. Finally Yü-Tien-ho or Khotan-darya is mentioned.

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[1] Festschrift . . . Richthofen, p. 404.

[2] Ein Chinesisches Werk über das westliche Inner-Asien. Its Chinese title is Si-yü-shui-tao ki or »Annotations about the watercourses of the western regions».

In the same work it is said that south of the town of Keriya a road crosses the Keriya mountains, going to Tibet. Further on, and according to the *Si-Tsang-tshi* or Description of Tibet the road is described more in detail. Going straight northwards from Lhasa one arrives in 24 days at Nak-thshan and thence in another 15 days at Shulungshan, after which it is 18 days to Keriya. The same road is also indicated in the *I-thung-yü-thu*, at least from Mar-yang-mum-dur, where it branches off from the Shigatse-Koko-nor road. Himly gives the situation of Mar-yang-mum-dur as 30° 54′ N. and 26° 6′ W. from Peking. The indication of the direction to the north from Lhasa must, as Himly suggests, depend on Nak-thshang (Naktsang) being confused with Nag-tshu-kha or »the Mouth of the Black Water», which is situated on the road to Koko-nor. Otherwise the northern direction should only refer to the part of the road which accompanies the western shore of Tengri-nor after which it takes a more westerly direction to Naktsang. In this case the Nak-thshang of *Si-yü-shui-tao-ki* should be identical with the Nag-tsang which, according to the I-thung-yü-thu, is situated on the road to Keldiya or Keriya. Nak-thshang is placed at about 32° 52′ N., and 28° 24′ W. from Peking, and N.W. of Altan-nor or Gold Lake in Mongolia. Shulungshar corresponds to the Shulunshala of the *I-thung-yü-thu* and is placed at 33° 25′ N., 29° 40′ W. A special sign shows that Shulunshala was even provided with a watch-post. Further west the road takes a more northerly direction crossing the Thshakartu-tsaghan-ussu and a nameless watercourse joining it from the west. Still further north the road crosses the frontier of Tibet at Sali (Sari), and makes a tremendous bend to the east, round a mountain and two lakes. One of these lakes is called Ghashon-nor or the »Salt Lake», and north of it the road crosses now in a westerly direction a north-going watercourse, and then the Shadutu-dabaghan or »Ladder-Pass». There the road touches a group of small lakes and reaches Eastern Turkestan *viâ* Suget.

According to the *Si-Tsang-tshi* there is a road from Rudok in Ngari to Yarkand, 15 days long.

This description of the old road is so clear and positive that its existence in those days cannot be doubted. But now it is quite forgotten both in Tibet and Eastern Turkestan. It is entered on Klaproth's map where it agrees in every detail with the translation given by Himly. It was of course impossible for Klaproth to tell anything more of this old road than what he found in the Chinese works. And, curiously enough, even to us, some 80 years later, it is impossible to add anything beyond what Klaproth knew. For the road is fallen into oblivion, and all the names it has are Mongolian, not Tibetan. In many respects, especially regarding the Nien-chen-tang-la his Niantsin tangla gangri, he was far in front of his time. Several decennia should pass before the journeys of the Pundits proved the existence of this range. And still, 60 years before Littledale discovered the Goring-la (19 587 feet), Klaproth has entered a M. Gouring-la on his map, situated S.W. of the glacier-massive of Nien-chen-tang-la. And when, in 1908, I received information about the

Shugu-la,[1] situated not far from Goring-la, I could not suspect that this pass already 72 years earlier had been entered upon a European map, namely Klaproth's. Under such conditions one would expect to find some of my many Transhimalayan passes, situated further west, on Klaproth's map, but there is not one of them, unless the Amyé-la is identical with my Samye-la, which is the more likely as d'Anville has, at the same place, a Samia M., the Mt. Samoié of the Ta-ch'ing map.

Now as the old road between Lhasa and Keriya passed along the western shore of Tengri-nor, one would have expected it to cross the Nien-chen-tang-la in Goring-la, but on Klaproth's map it crosses the range at a long distance S.W. of this pass. However, leaving the Transhimalaya behind, the road goes down to the western shore of Tengri-nor, and then we find the following names along it: Oussoun noor, a lake to the right side of the road, Khouloukhou noor, a lake to the left, Telke tolokhai,[2] a place on the road with lake Altan noor to the south; Nak dzang on the road, Bouka tolokhaï[3] and Bouk tolokhai on the road, probably a repetition of the same place, Chouroum chara on the road, Tchakourtou tchagan oussou, a river flowing north and east, Sari on the road, Gachoun noor to the left, Barkhatou or Balkhoutou a place on the road where it crosses the M. Chatou tou dabahn, Soughet a place on the road, Altan gol, Khargachi a place on the road, Hitsi on the road, Yechil gol a river going north to the lake Yechil Koul from which the Keldia gol or Keriya-darya is supposed to issue. Finally it reaches Tak where it divides into two branches, the eastern going to Keriya, and the western to Tchere or Tsirla, or as we have it, Chira.

On Dutreuil de Rhins' map (Pl. VII) the road has the same running up to Sari and the same names as Klaproth's map. But beyond Sari, de Rhins has the legend: *Partie très-incertaine de l'itinéraire de Khotan au Tengri-nor*, and the difference between the two maps is here very great. De Rhins has, west of Gashoun nor a place called Imam Noulah.[4] N.W. of Altan gol he has an Aritan tun instead of Klaproth's Khargachi; he writes Ilitsi where Klaproth has Hitsi. From there the road continues north-westwards to Polu, which is the same as Tak. De Rhins' placing of lake Yeshil Koul is in accordance with Klaproth's conception, but both are wrong, for very likely the well-known Yeshil-kul, east of Lake Lighten is meant, so much the more as the road continues from there to Keriya-daban or Keriya-kotel, well-known to Ladakis and natives of Eastern Turkestan.

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[1] Compare my Trans-Himalaya, Vol. II. p 408. Gouring-la is a better spelling than Goring-la. I heard the name pronounced as Guring-la.

[2] Misprint for Tebke-tolokhai.

[3] Himly writes this name Bugho-tologhai and translates it »The Stag's Head», which is certainly wrong and ought to be »the Wild Yak's Head». Nord-Tibet und Lob-nur-Gebiet in der Darstellung des Ta-tshing i thung yü thu (erschienen zu Wu-tshang-fu, 1863) unter Mitwirkung des Herrn Karl Himly herausgegeben von Dr. Georg Wegener, Zeitschr. d. Ges. f. Erdk. zu Berlin, XXVIII Band, 1893, p. 201 et seq.

[4] Probably misprint for Moulah.

The difference between Klaproth's and de Rhins' maps as to the general situation of this road is not at all surprising. For de Rhins had the modern exploration and specially the important results of Prshevalskiy's expeditions, at his disposal. But if we compare Klaproth's map with the map of Tibet in *Stieler's Hand-Atlas* for 1875 (Pl. XXVIII) we find that the difference is not very great. The great eastern turning of the road round Gashun-nor is the same in both cases. For in 1875 Prshevalskiy had not yet accomplished his journey to Lop-nor, which changed the map of Central Asia completely. The situation de Rhins has given the road on his map of 1889 returns on Stieler's maps of 1891, 1895 and 1901 (Pl. XXIX). On Stieler's edition of 1904 (Pl. XXX) the old road has disappeared, and does not return any more.

If we transport the old road from Stieler 1901 to Stieler 1911 (Pl. XXXI) we shall find that it goes east of Selling-tso and then continues straight N.W. between Littledale's route of 1893 and my route of 1906, after which it approaches Lake Markham and finally reaches Polu. But this is certainly wrong, for the Chinese itinerary touches Yeshil-kul and goes even south and west of this lake. Keriya-daban or Keriya-kotel, which is mentioned in the Chinese sources, is situated a short distance north of Yeshil-kul. If we accept the old road as having no doubt existed and as having been used for a certain time, there is no doubt that its north-western part has touched Yeshil-kul and Keriya-kotel, from where it has continued northwards to Polu along or near the same line as the one followed by Dutreuil de Rhins on his journey between Panggong-tso and Polu. From Lhasa to Selling-tso the travellers met no difficulties and from Yeshil-kul to Polu they were all right. But the road from Selling-tso to Yeshil-kul, with a length of 500 miles, was a hard piece of work. And we may feel pretty certain that the road has never had any importance. The road from Lhasa to Leh and thence *viâ* the Kara-korum pass or Keriya-kotel is, of course, much easier though considerably longer.

In another article, *Ueber zwei chinesische Kartenwerke*,[1] Himly makes us acquainted with the *Kuang Yü Thu* or the enlarged map of the empire. It depends upon another cartographical work which was accomplished in 1311 to 1320. In the time of the Mings it appeared in a fresh and enlarged edition, and seems to have been ready for print in 1566. During the following century, under the Manchus, several new and far superior works of the same kind appeared, but still, in 1799, a new edition of the antiquated *Kuang Yü Thu* was issued. On one sheet of this map the eastern part of Kwen-lun is called Yi'-r-ma-pu-mo-la-khi, and on another, representing the whole course of the Hwangho, this name is translated into Thöng-khi-li-tha, which Himly suggests may be Tengri tag.

[1] Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Bd XIV. Berlin 1879, p. 181 et seq.

In the second part of the work the non-Chinese tribes in- and outside of China, and their territories, are described. Map 15 represents the countries west of Szechuan. The Kin-sha-kiang is supposed to have its sources in Yunnan, proving how little that province then was known. The Nu-kiang (Salwen) and Lan-thsang-kiang (Mekong) have also their sources in Yunnan. The map places Odon-tala as a source-lake of the Hwangho far to the south, about the same latitude as Lhasa and makes the Kin-sha-kiang rise in the same neighbourhood, a view which, according to Himly, must depend upon a confusion between the Himalaya and the Kwen-lun. Map 23 of the second part of this work represents »the Western Lands», Si-yü, Ili and Tibet, but Himly's article does not contain anything of interest concerning this sheet.

CHAPTER IX.

EUROPEAN INFORMATION AT THE END OF THE EIGHTEENTH AND BEGINNING OF THE NINETEENTH CENTURIES.

Hardly any part of the interior of Asia, perhaps only with the exception of certain sections of the courses of the Indo-Chinese rivers, has been so difficult to approach, as the province of Bongba with surrounding regions of Tibet. In the latter half of the 18th century European scholars seem to have had greater confidence in the classics than in the Chinese writers. The result was, even regarding the Himalayas, a great confusion and very vague orographical ideas. We get a glimpse of this general uncertainty from two or three quotations of ANQUETIL DU PERRON's discussion on TIEFFENTHALER's work.[1]

»Selon la carte géographique ce sont les monts Comedes et le pays des Comedes qui forment les frontières septentrionales de l'Inde. Ces monts Comedes sont des montagnes du Tibet et de Caschgar branches du Taurus, lequel prolongé depuis la Lycie au Couchant jusqu-à l'extrémité de la Chine au Levant, produit en quelque sorte plusieurs autres montagnes, comme autant de branches ou de bras qui s'étendent au travers de l'Asie tant vers le Nord que vers le Midi . . . Imaus est aujourd'hui Camaoun, région montagneuse sur la rive ultérieure du Gange: et il ne faut pas s'arrêter à ce que les Anciens donnent à l'Imaus une position différente; car ils n'avoient pas parcouru eux-mêmes les pays: ils se sont trompés pareillement sur la situation d'autres contrées.»

In the following passage one suspects, with some good will, the Transhimalaya, or, at any rate, the mountains of Tibet.

»Il faut chercher les monts Apocopes ou dans les cantons montagneux qui s'étendent au Nord, de Cachemire au Tibet, ou bien dans les très hautes montagnes situées également au Nord entre Neipal et Lassa, capitale du Tibet.» Even in the following sentence there is much confusion: »L'Inde est entourée de montagnes presque de tout côté. A l'orient elle a les montagnes de Mogan & d'Aracan; au Nord-est celles de Camaoun & du Tibet, qui s'étendent presque jusqu-à la Chine; a l'Ouest celles du Sistan ou Segestan; au Nord-ouest le Paropamise; les montagnes de Caschgar la bordent au Nord . . .»

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[1] Description historique et géographique de l'Inde etc. . . . publiée en François, par M. Jean Bernouilli, Berlin 1786. Tome I, p. 45 et seq.

On Tieffenthaler's map there is, north of the Manasarovar, the likeness of a mountain, obviously Kailas.[1]

JOHN STEWART gives us in a letter to John Pringle the same feeling of uncertainty about the mountains north of India. In his *Account of the Kingdom of Thibet* he only tells us that this country »lies to the northward of Hindostan, and is all along separated from it by a range of high and steep mountains, properly a continuation of the great Caucasus, which stretches from the ancient Media and the shores of the Caspian sea, round the north-east frontiers of Persia, to Candahar and Cassamire, and thence, continuing its course more easterly, forms the great northern barrier to the various provinces of the Mogul empire, and ends, as we have reason to believe, in Assam or China».[2] This description even reminds us of old Ptolemy.

Major RENNELL gives us another example of a desperate struggle to make the best of the extremely meagre material existing at the time.[3] We have seen that he adopted the view of the Lama surveyors regarding the source of the Ganges and still he had no confidence in their map. Discussing the position of Lhasa he says: »We have the history of the Lamas' map in du Halde, which is not altogether favourable to its character; especially in the parts towards the source of the Sanpo and Ganges. A close examination of its particulars, turns out still more unfavourable to it. For instance, the place where the Ganges enters the plains of Hindoostan, is placed under the 28th degree of latitude; tho' it is known by our late observations, to be in about 30° . . . With respect to Hurdwar, the proof is positive of its being 2 degrees farther to the south than it ought to be; and this furnishes a strong presumptive one, that all the western parts of the map, are faulty in the same proportion: and that the sources of the Ganges and Sanpoo, instead of being between the 29th and 30th degrees of latitude; are, in fact, between the 31st and 32nd . . .» As regards Lhasa, he says, d'Anville adopted the view of the Lamas and placed it at 29°35′ N. lat. This is on the detailed map; on the general map it is at 29°10′. »Father Giorgi, who travelled to Lassa from Bengal (and whose route is expressed in my map) says the latitude of Lassa is about 30 degrees and a half, and . . . it can hardly be in a lower parallel.»[4] In this view Rennell was more perspicacious than regarding the source of the Ganges. It does not matter that he is mistaken in believing that Georgi travelled the route to Lhasa himself. Of this itinerary Rennell says we are entirely in the dark as to the particular direction of his course, which is not surprising if we remember how little Tibet was known in Rennell's time.

In the following words Rennell expresses his opinion about Tibetan mountains in general: »Between Tassasudon and Paridrong, is a chain of mountains still higher

[1] Vol. I, Pl. LII.
[2] The Annual Register . . . London 1786, p. 32.
[3] Memoir of a Map of Hindoostan; etc. . . . Second Edition. London 1785, p. 96 et seq.
[4] Op. cit. p. 97.

than the other. They are visible from the plains of Bengal, at the distance of 150 miles, and are commonely covered with snow. These are a continuation of the mountains Emodus and Paropamisus of the ancients; and are sometimes by the moderns erroneously called Caucasus. By the Thibetians, they are called Rimola. I take them to be in point of elevation equal to any of the mountains of the old hemisphere. Indeed, the country of Thibet is, altogether, one of the highest in Asia, it being a part of that elevated tract which gives rise not only to the rivers of India and China, but to those also of Siberia and Tartary: for if we examine the map of Asia, we shall find that most of those capital rivers rise between the 31st and 47th degrees of latitude, and between the 70th and 97th degrees of longitude; from whence they run in every direction to the sea, as the Rhine, Rhone, Danube, and Loire, do from the Alps in Europe.»[1]

He did not and could not go further than to say that Tibet was *one* of the highest regions in Asia. It is a fruitless task to search for a sign of the Transhimalaya, and when he says that from the top of Kambala »may be seen towards the north, a range of still higher mountains covered with snow», this phrase is taken from Georgi or rather della Penna or Beligatti.[2]

When GEORGE BOGLE started from Calcutta in May 1774, he had been furnished with some »Private Commissions» by the great Governor-General WARREN HASTINGS, where § 6 says the emissary had »to keep a diary, inserting whatever passes before your observation which shall be characteristic of the people, the country, the climate, or the road, etc.», and § 7 that he had »to inquire what countries lie between Lhasa and Siberia, and what communication there is between them. The same with regard to China and Kashmir.» In his *Memorandum on Tibet*, accompanying the instructions to Mr. Bogle, Warren Hastings begins by saying: »Tibet is a cold, high, mountainous country.» And he continues: »I have been told that a large river forms a boundary between China and Tibet, which was carefully guarded by the troops of both countries; and that Tibet received European commodities by the valley of Kashmir. But I have learned nothing satisfactory on these subjects . . . The history, government, and religion of Tibet are no doubt more interesting objects of inquiry than its climate or topographical and physical characters; yet these, too, are highly curious. The great rivers of the south and east of Asia appear to issue from its mountains. It is probably, therefore, the highest land in the old continent, and this circumstance, together with the difficulty of access to it, give it a striking analogy to the valley of Quito, in South America . . .»

It would be unjust to Bogle to expect the same perspicacity and intelligence from him as from Warren Hastings. But as he was specially asked to make inquiries about the countries between Lhasa and Siberia, he ought, at least, to have tried to find out where the road of Namling-dsong went. In Namling certainly every-

[1] Op. cit. p. 99.
[2] Compare p. 21 above.

body knew or had heard of Khalamba-la and Tengri-nor and Nien-chen-tang-la. Rennell, who wrote a few years later, was no doubt right in saying: »Unfortunately, very little geographical information was furnished by this journey; unless the bare account of the number of days he was on the road between the two last places (Paridrong and Chanmanning) may be deemed such.»[1]

Indeed his report is meagre in geographical information from Tibet. Of the Chumalhari he only says: »It stands between Tibet and Bhutan, and is generally white with snow. It rises almost perpendicular like a wall, and is attended with a string of smaller rocks, which obtain the name of Chumalhari's sons and daughters.»[2] In his general *Account of Tibet* he has only the following passage about the mountains of the country: »It is full of hills: they might be called mountains if they were not so near to those in the Deb Rajah's kingdom; however, one has few of them to climb, the road leading through the valleys . . . The country is bare, stony and unsheltered; hardly a tree is to be seen, except in the neighbourhood of villages, and even there in no great numbers.»

Although Bogle was the first Englishman, and up to the present day one of the very few Europeans who have succeeded at all in penetrating a part of the Transhimalaya, he leaves his readers in complete ignorance of its existence. He even hesitates to call the hills of Tibet mountains. Warren Hastings had a much clearer idea of the morphology of Tibet before than after this journey, and if ethnology and religion are taken into consideration Bogle can never be compared with Desideri.

In spite of his excellent narrative and admirable map, SAMUEL TURNER did not bring back any new information from inquiries about the country north of the Tsangpo. His journey, 1783—84, does not augment our knowledge of Tibet, except his own route which he surveyed so carefully. As to the Chumularee (Chumolari) he only says: »The mountain did not appear very lofty from the level of this plain; and I think we passed it, leaving it on our right, at about the distance of three miles: yet the great altitude of this great part of Tibet is demonstrated, not only by the many rivers that originate in these frontier mountains, and flow towards the south, with a great descent, through Bootan into Bengal: but because the streams issuing from it a little further to the north, and taking a northerly direction, fall into the Berhampooter, and are finally conveyed with it, to a junction, in the neighbourhood of the sea, with the waters which flow in a contrary course, from the same general store. I conclude, therefore, that spot on which we now stood, constitutes the highest point of land, in what is called Little Tibet . . . Chumularee is for ever clothed with snow . . .»[3] Regarding the country to the north I cannot find anything more in Turner's book than what he says of a party of Tatar pilgrims and their way

[1] Memoir of a Map of Hindoostan, p. 97.
[2] Markham, op. cit., p. 70.
[3] An Account of an Embassy etc. London 1800, p. 207.

back which is said to go »from Teshoo Loomboo to Lassa, twelve days; from Lassa to Daum, ten days; from Daum to Sullum, thirty days.»[1] Daum is probably Dam and Sullum »Silling» or Sining. From his apartment in Tashi-lunpo he could see the road that leads to Bootan and Bengal; »on my right, the roads to Luddauk and Cashmeer; to the mines of lead, copper, cinnabar, and gold; and also by Tingri Meidân to Nipal: on my left, are the roads to Lassa and China: on the north is situated the territory of Taranaut Lama, bordering upon Russia, and Siberia, and whose influence more especially extends over the Kilmauks or hordes of Calmuc Tartars.»[2] His idea of Sining is not nearly so good as Desideri's. He only says: »The commerce between Tibet and China, is carried on principally at a garrison town, on the western frontier of China, named Sinning, or Silling: thither merchants resort from Tibet with their manufacture . . .» On Turner's map there is no room at all for the country north of the Tsangpo.

THOMAS MANNING in 1811—12 says of the Kamba-la: »The height of the mountain was trifling. After a mile and a half or two miles easy ascent we were at the top; but the level of the valley on the other side was considerably lower than the one we departed from. The descent was long, tedious, and in many places troublesome.»[3] He does not know the name of this important pass, so familiar to the Capuchins a hundred years earlier. The mountains to the north, mentioned by them, have not caught his attention. This may have depended on clouds, but during his stay in Lhasa he could easily have gathered much valuable information. But his account, published more than 60 years after the journey, hardly contains a word of any value. »It is a meagre record of so important a journey» says Sir FRANCIS YOUNGHUSBAND, who nearly 100 years later followed Manning's steps.[4]

An excellent map by TREL. SAUNDERS, 1876, illustrating the journeys of Bogle, Turner and Manning, has been added to Markham's book (Pl. XXI). On his map the Nien-chen-tang-la has been marked as a very sharp and well defined ridge between Tengri-nor and Lhasa.

MOORCROFT who in the history of exploration in Tibet occupies such a prominent place, could hardly be expected to have heard anything of the Transhimalayan ranges. On the map to his journey 1812 (Vol. II, Pl. III) he has, north of Manasarovar and Rakas-tal a mountain range stretching N.W. to S.E. and called Cailás Mts. Near its N.W. end he has »Mts totally covered with recent snow», further S.E. »Double Snowy Point» and finally »Mt Cailása». On his map these mountains are not shown as a range, but rather as the edge of a plateau-land, or the abrupt and steep step from the plateau to the depression or plain where the lakes are situated.

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[1] Op cit., p. 274.
[2] Ibidem p. 296.
[3] Markham, op. cit. p. 250.
[4] India and Tibet. London 1010, p. 39.

On JOHN ARROWSMITH's map of 1841 in H. H. WILSON's book on Moorcroft's and TREBECK's journeys 1819 to 1825,[1] the range has not undergone any other changes than the spelling of the name which is now Kantesi or Kailas Mt. On the same map the Kara-korum mountains are drawn as one high range in immediate connection with the »Hindu Kosh», and to the east ending at about 79° E. long., not far to the north of Panggong-tso. Both in the text and on the map Little Tibet, Ladak and Chang-tang are placed as it were in a tremendous valley between the Kara-korum Mountains and the Himalaya. But the space of this valley is also filled up with mountains, amongst which the most important is the one situated north of Leh and south of Panggong-tso, forming the watershed between the Shayok and the Sinh-kha-bab R. The Western Transhimalaya or Kantesi Ms are represented as if they formed the watershed between the Gartok branch of the Indus and the Miser-branch of the Satlej and further on between the Gartok-Indus and the Satlej itself.

Nor can we expect to get any information touching the mountains north of the Tsangpo from the English travellers to Nepal in the first decades of the 19th century. KIRKPATRICK in his beautiful work has nothing of Tibet, except some itineraries.[2]

In 1792 Lord CORNWALLIS and the British Government in India got an opportunity to approach Nepal, which, so far, had been jealously closed by the Gurkhas. Tibet was under Chinese protection, and in fact a Chinese dependency. Nevertheless the Government of Nepal had made certain encroachments upon the rights of Tibet, and should therefore be punished. A considerable army was despatched and made an admirable march across this world of complicated mountains. Without meeting any opposition it reached within a short distance of Katmandu. Alarmed by the menacing danger the Government of Nepal implored the assistance of the Bengal Government. An embassy had to be sent to try and settle matters with the Chinese in a peaceful way. Captain William Kirkpatrick was appointed envoy.

The Chinese army entered through the Kheroo pass and proceeded almost to the foot of Maha-mundul, which, on Kirkpatrick's map is only 15 miles from Katmandu. The place where they stayed was called Noakote.

Kirkpatrick's mission had no opportunity to contribute to the knowledge of Tibet in his time. He only gives the stations and characteristic features of some roads as described by Nepalis and therefore of inferior value to those itineraries, we have from the Capuchin missionaries. One is from Noakote to Joongah passing Mount Deoralli, »one of the loftiest peaks of Himma-leh». Not far from it the Chinese had an obstinate action with the Nepalis. At Kheroo you reach »the table land of

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[1] Travels in the Himalayan Provinces of Hindustan and the Panjab etc. London MDCCCXLI.

[2] An Account of the Kingdom of Nepaul, being the substance of observations made during a Mission to that Country, in the year 1793. By Colonel Kirkpatrick. London 1811.

Tibet. You see no snowy mountains from Kheroo in the north quarter: but you observe them in the south, in the west, and in the south-east quarters».

Joongah was supposed to be one of the highest points in Tibet. There is a lofty hill with a strong fort belonging to Dalai Lama. From Muoophaut there was said to be a good road to Tingri-maidan, which occurs in the route to Diggercheh (Shigatse) *viâ* Kooti. By this route the Chinese army proceeded to Noakote in 1792.

He gives the stations on the road from Katmandu to Diggercheh or Teeshoo Lomboo. Lungoor-phede is the foot of the passage through the Himma-leh, thus Lungoor is probably the well-known Langur of the Catholic missionaries. »The source of the Bhootia-kousi is said to be at no great distance from hence, and not far from the springs of the Arûn or Aroon, rising at different sides of Himma-leh. The elevation of the pass over which you proceed through Himma-leh is very inconsiderable, consequently those stupendous mountains must tower sublimely over the traveller's head.»

Tingri or Tingri-maidan on the Arun: »from hence the road to Diggercheh is quite level, and tolerably direct. From Tingri, the Napaul army, in its invasion of Tibet a few years hence» proceeded to Ghuttia-pany on the Arun. Diggercheh is said to be three miles from Berampooter (Brahmaputra).

There is also an itinerary of the road from Katmandu to Shigar-dsong. Many of the names given are those used in Nepal. He writes Lehassa, Lhasseh, Pootla Lama (Potala) etc.

FRANCIS HAMILTON lets us at least get a glimpse of the mountains. He says Kirkpatrick believed in the existence of two distinct ranges of Emodus or »Himaleh», and he continues: »Now, in the maps which I obtained from the natives, three ridges may in some measure be traced, as proceeding from about the lake Manasarawar, which may be considered as the centre of Emodus . . . The most northern ridge, which is probably the highest, as it is nowhere penetrated by rivers, approaches Hindustan only at the lake Manasarawar, where the remarkable peak called Kailasa may be considered as its centre. This peak may perhaps be visible from the southward, although there exists no certainty of its being so; but the portions of this ridge, which extend west and east from Kailasa, bordering on the north, the upper part of the Indus, and Brahmaputra rivers, are certainly invisible from every part of Hindustan, and very little is known concerning them.»[1]

It would have been very interesting to get some more information about the maps Hamilton obtained from the natives. He can hardly mean any Chinese map. Are the three ridges he speaks of the same as those found on HODGSON's map[2] and has Hodgson got his information from the same source as Hamilton? For if this be the case Hamilton's northern ridge should be identical with the mountains

[1] Francis Hamilton: An Account of the Kingdom of Nepal, Edinburgh, 1819, p. 90.
[2] Pl. XV.

north of the Tsangpo. This indeed seems to be the case, as he says the Kailas may be considered its centre, and the western and eastern parts of the ridge are situated north of the upper Indus and Brahmaputra. Every doubt disappears by a look at his map (Vol. II, Pl. V), where the Kailasa Mountains stretch from a point N.E. of Manasarovar towards the west. But he has not dared to enter on his map the eastern continuation of the range, from Manasarovar and further north of the Tsangpo. For, as he says, very little is known of this range. And he has left to others to take another step, namely to suggest that this »ridge» were in connection with the Nien-chen-tang-la of the Chinese maps.

The Chinese were incomparably better informed about the Tabie-tsaka and its salt deposits than Hamilton. They knew, years before, not only the fact of salt transport from the place, but had also made a map both of Tarok-tso and Tabie-tsaka. Hamilton only heard from the natives of Nepal that such a lake existed: »The borax and salt are said to be brought from a lake, which is situated nearly north from Kathmandu, about fifteen day's journey beyond the Brahmaputra. They are conveyed to Nepal on the backs of a large kind of sheep, of which many have four horns, and which seem to be the common beasts of burthen in all the countries towards the sources of the Indus, Ganges, and Brahmaputra.»[1]

It is curious to see how, a hundred years ago, Europeans hardly dared to approach the question of the existence of a mountain system or range north of the Tsangpo. If Hamilton had only seen d'Anville's map he could have compared the information he got from the natives with the results of the Chinese survey. He would not have been able to proceed any further than to say that this coincidence proved beyond doubt the *existence* of a mountain system, although it had to be explored to be known. Even when he speaks of the trade route from Digarchi (Shigatse) and Lhasa to »Siling or Sining», the conclusion should have been near at hand, with the assistance of the Chinese map, that this road had to cross the eastern continuation of this »third ridge». But there are innumerable examples of how long a time has been necessary to clear up geographical problems, and it is not surprising that this should in a very high degree be the case in such a country as Tibet, so difficult of access.

Nearly all the knowledge possessed by J. B. FRASER regarding the Trans-himalayan regions is included in the following passage of his: »The only European travellers who are known to have entered on this new ground are Messrs Moorcroft and Hearsay who penetrated by the Nitee-Mana pass, and reached the lake of Mantulloee, Mansrowar, or Mepang. All these sources lead us to presume a pretty extensive detail of hills beyond the loftiest belt, that by no means terminate even at Gara or Gartope, though they do not reach the height of those to the westward and southward. A branch of the Cailas range, undoubtedly a ramification of

[1] Op. cit. p. 214.

the Himālā, stretches out beyond the lake Mansrowar, a considerable way towards Gartope. Beyond this point there seem at present to exist no grounds, on which even a conjecture may be formed concerning the nature of the country.»[1]

On his famous journey through Mongolia to China G. TIMKOVSKIY got some information about Tibet. His short description contains many mistakes, but as his journey attracted great and justified attention, his geography of Eastern Turkestan and Tibet was for a long time considered as reliable as the description he gave of countries and places he had seen himself. A few quotations are therefore in their place in this connection.[2]

He says that Eastern Turkestan, in Europe usually called Little Bokharia or Jagatai, is, on the east bordered by China and the Kuku-nor Mongols, and on the west by the Snowy mountains, i. e. Mussart, Musstag or Imaus. On the south it is bordered by Tibet. In 1758 the country was conquered by Emperor Chien Lung who called it the new line, for, as it was enclosed on the north and south by high mountains it resembled a strip of land. On the south-western (!) side was the Turkish or Tatar town Lobnor.

»Die ganze Strecke von Pitschang gegen Westen bis nach Ilzi auf 4 000 Li (286 deutsche Meilen), von Ilzi gegen Süden bis nach Klein-Tibet, auf 5 000 Li (357 d. M.), und eben so 4 bis 5 000 Li gegen Osten, ist gänzlich unbewohnt und mit unzähligen Quellen bedeckt. Auf dem dadurch gehenden Wege sieht man entweder nackte Steppen und Moräste, oder senkrecht empor ragende Berge, mit ewigem Schnee bedeckt, Einöden und Flüsse. Es ist kein Ort, wo es nicht eine Quelle gäbe . . . das Wasser hier ist grösstentheils gelb. Alle diese Quellen und Flüsse, die von der Südseite der Schneeberge in der neuen Linie herabfliessen, vereinigen sich endlich in Lobnor. Neben diesem See liegen zwey Flecken, deren jeder ungefähr 500 Häuser hat.»

He has heard the names of all the towns of Eastern Turkestan, gives even the number of their inhabitants, the products and the trade of the country, and has a fairly correct idea of the situation.

The part of Tibet where »Dshessilumbu» is situated and Bogdo Lama resides he calls Little Tibet, whereas Great Tibet is the country of the Dalai Lama.

The frontiers of Tibet he describes in the following way:[3] »Westlich von Chlassei-Ziokan, weiter jenseit Dshessilumbu fängt die Gränze von Neri an, die durch Gantessiri nordwärts in das nerische Städtchen Kerdudsun geht. Die andere Gränze geht südwestwärts über Ssänge-Charaker bis Nelam, das an das indische Königreich Gorka gränzt.» He knows that Ngari's neighbours are two nations: Laták and Guguldse. North of Lhasa the plain regions begin, and in the west Lhasa is in communication with Little Tibet. To the north, »through the desert», and passing Muru-ussu and Gurdson Gutscha one comes to the frontier of Kukunor. In old

[1] Journal of a Tour through part of the Snowy Range of the Himalā Mountains, and to the sources of the Rivers Jumna and Ganges. London 1820, p. 283.

[2] Reise nach China durch die Mongoley in den Jahren 1820 und 1821, Leipzig 1825. Band II, p. 72 et seq.

[3] Loc. cit. p. 177.

times Tibet was divided into 3 parts: Chamba, Juiba and Dsanba. In these names it would perhaps be difficult to recognise Kam, U and Tsang, unless we were told that their resp. capitals were Dsiamdo, Chlassa and Dshessilumbu. Of U he says that it is to the west bordered by the western sea, i. e. Terkiri or Tengri-nor. He reckons 8 days between Lhasa and Tashi-lunpo. The three provinces, which he later on more correctly calls Kam, Ju and Dsan, have 3 000 temples and 84 000 Lamas. He gives much interesting information of the ethnology, religion and history of Tibet, which he has probably got from P. Hyacint and other members of the Russian mission in Peking.

As Timkowskiy's description is rather short and vague, one cannot, of course, expect any news of the mountains north of the Tsangpo.

The Hungarian ALEXANDER CSOMA DE KÖRÖS is another great traveller who has written on the geography of Tibet, though never visited Tibet Proper. However, his *Geographical Notice of Tibet*[1] contains some rather interesting hints about the great mountain-ranges north of India, and described from an entirely Tibetan point of view. He says:

»Tibet is bounded on the north by the countries of the Turks and Mongols, whom the Tibetans call Hor, and Sok-po (Hor-sok).»

»From the first range of the Himalaya mountains on the Indian side to the plains of Tartary, the Tibetans count six chains of mountains running in a north-western and south-eastern direction, when viewed from Kangri in Nári (a lofty mountain running from south-west[2] to north-west), whence the ground commences to take on one side a north-western and on the other side a south-eastern inclination. In the spacious valley, which is between the third and fourth range of the before mentioned mountains, is the great road of communication between Ladak and U-tsang . . . It is here likewise, that the two principal rivers, the Sengé k'há-bab, and the Tsánpo take their course; that by Ladak to the north-west, and may be taken for the principal branch of the Indus; this to the south-east, and forms afterwards the Brahmaputra.»

»Beyond the fourth range of the Himalaya mountains, or in the next valley to the north of Ladak, there are the following districts, counting them eastward: Nubra, Rudok, Tso-tso, Bomba, Chang-ts'ha-k'há, Chang-ra greng.»

Of the six ranges which are thus regarded as crossing the Tibetan highland between India and Tartary no less than three are placed south of the great Indus-Tsangpo valley. The fourth range may be easily identified with the Transhimalaya, though Csoma reckons it to the Himalaya, a view in which he has been followed by Markham. North of this fourth range is a new great valley in which Rudok and Bomba (Bongba?) are situated, a conception which is very near reality.

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[1] Journal Asiatic Society of Bengal, N:r 4, April 1832, p. 121 et seq.
[2] Must be a misprint for south-east.

I have given above a short extract of the Tibetan geography of the MINCHUL KHUTUKTU who died in 1839.[1] He says that »north of these mountains (Himalaya), there is a snowy mountain, although several people regard this last mentioned one as one and the same with Gan-dise (Gaṅs-ti-se), but it seems more suitable to attribute this name, as a nomen appellativum, not only to the Gandise, but also to many thousands of other mountains» between Kabul and Kam (K'ams). It cannot be said without hesitation that he means the Transhimalayan system, as the snowy mountain he speaks of was probably the Kailas. He mentions the lake Namtsochugmo (sKyem-gnam-mts'o-p'yug-mo) or Tengri-nor and »one of the four stormy, snowy mountains, gÑan-c'en-t'aṅ-lhai-gaṅs-ri (Ngan[2]-chen-tang-la-gangri)», but he does not say whether he has seen it himself or heard it described by others.

Thus the Khutuktu has known the western and eastern boundary pillars of one system, and even some snowy mountains north of the Himalaya but he has by no means approached the orographical problem any nearer than the Chinese topographers.

Among European compilators from Chinese and other sources Father GROSIER may also be mentioned. He has a special chapter on Tibet (Chapitre IV: Du Thibet)[3] in which he gives some very short and rather good information of the country.

Le Thibet est connu sous différents noms. Les Chinois l'appellent Tsan, les Tartares Barantola, Bouttan, Tangout .... Le Thibet est renfermé entre le pays de Kokonor, les provinces chinoises de Sé-tchuene et d'Yune-nane, le royaume d'Ava, les Etats du Mogol, la Buckarie et le grand désert de Cobi. Son étendue, d'orient en occident, comprend plus de vingt degrés, et plus de huit du nord au sud.

He deals with the history of Tibet, and then describes its climate, productions, etc.

La saison humide commence en juin et dure jusqu'au mois de septembre; les pluies sont alors abondantes et presque continues. Depuis le mois d'octobre jusqu'au mois de mars, l'air est pur, le ciel serein, et presque jamais obscurci d'aucun nuage .... Le Thibet, par sa position géographique, participe à l'élévation du plateau de la Tartarie et à la nature de son sol, imprégné de nitre ...

La partie la plus occidentale du Thibet, laquelle s'étend jusqu'aux frontières des Etats du Mogol et de la province de Cachemire, est un pays peu connu, fort rude, et hérissé de montagnes presque impraticables. Les passages étroits qu'elles laissent entre elles ouvrent cependant l'entrée du Thibet à quelques voyageurs, qui, venus de la Perse ou de l'Inde, ont assez de courage pour tenter cette route.

Father Grosier has some quotations from Desideri and Lettres Edifientes, and that is all he has to tell concerning western Tibet. Still, he had a more correct conception of the country than Rawlinson so many years later. He also knows the narratives of Turner, Robert Saunders and George Bogle, and, of course, the work of P. Georgi.

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[1] See Vol. I, p. 126. Geografia Tibeta perevod is Tibetskago sochineniya Minchul Khutuktiy, V. Vasilieva. S:t Petersburg 1895.

[2] According to Professor A. Grünwedel the form Ngan is preferable to Nien and Nyen.

[3] De la Chine, ou description générale de cet empire, rédigé d'après les mémoires de la mission de Pé-kin. Troisième édition, par M. l'Abbé Grosier, Paris 1818, Tome deuxième, p. 59 et seq.

TRANSHIMALAYA DURING THE LAST HUNDRED YEARS

CHAPTER X.

HUMBOLDT ON THE MOUNTAIN SYSTEMS OF CENTRAL ASIA.

In the present chapter I give some quotations from the works of ALEXANDER VON HUMBOLDT, so far as they offer us an idea of his orographical systems in the interior of Asia. He subdivides the whole mountain skeleton of Asia into four principal systems, or, as he expresses it: »La partie moyenne et intérieure de l'Asie qui ne forme ni un immense nœud de montagnes ni un plateau continu, est coupée de l'est à l'ouest par quatre grands systèmes de montagnes qui ont influé manifestement sur les mouvements des peuples; ce sont l'Altaï qui à l'ouest se termine par les monts des Kirghiz; le Thian-chan, le Kuen-lun et la chaîne de l'Himâlaya.»[1] Between the first and second is Dsungaria, between the second and third Little or High Bokharia and Gobi etc., between Kwen-lun and Himalaya eastern and western Tibet with Lhasa and Ladak. He describes every one of these systems separately and speaking of Himalaya he notices that, on the meridian of Attock and Jellalabad it approaches the Kwen-lun so closely, that it appears to form *one* mass of mountains together with the Hindu-kush and the Tsung-ling.[2] »De même l'espace entre l'Himâlaya et le Kuen-lun est plus resserré par des chaînes secondaires et des masses de monts isolés, que le sont les plateaux entre le premier, le second et le troisième systèmes de montagnes.» But it would be wrong to think that the height of the plateau between the Kwen-lun and Himalaya was the same all over:

»Deux fleuves considérables, l'Indus et le Zzangbo (Tsampou), indiquent, dans le plateau du Tubet, au nord-ouest et au sud-est, un abaissement dont l'axe se trouve presque sous le méridien du gigantesque Djavahir, des deux lacs sacrés le Manassoravara et le Ravana Hrada, et du mont Kaïlasa ou Kaïlas, en chinois O neou ta, en tubetain Gang dis-ri (mont couleur de neige; sur les cartes de d'Anville Kentaisse). De ce noyau sortent: la chaîne de Kara koroum padichah, qui se dirige au nord-ouest, par conséquent au nord de Ladak, vers le Thsoung ling; les chaînes neigeuses de Hor (Khor), et de Zzang qui filent à l'est. Celle de Hor, à son extrémité nord-ouest, se rattache au Kuen-lun; il court, du côté de l'est, vers le Tengri nor (lac du Ciel). Le Zzang, plus méridional que la chaîne de Hor, borne la longue vallée du Zzangbo,

[1] »Mémoire sur les chaînes des montagnes et les volcans de l'Asie intérieure . . .» in Fragmens de Géologie et de Climatologie Asiatiques par A. de Humboldt. Paris 1831, p. 23 et seq.

[2] Op. cit. p. 75.

et file de l'ouest à l'est vers le Nien tsin tangla gangri, très haut sommet qui, entre H'lassa et le lac Tengri noor (mal à propos nommé Terkiri), se termine au mont Nomchoun oubachi. Entre les méridiens de Gorkha, de Khatmandou et de H'lassa, l'Himâlaya envoie au nord vers la rive droite ou bord méridional de la vallée du Zzangbo, plusieurs rameaux couverts de neiges perpétuelles.»

In this passage we easily recognize the same orography as in Ritter's work, a fact that is not surprising, remembering that both authors have used the same sources, the Chinese texts translated chiefly by Klaproth. Klaproth positively dominated the geographical conception of Central Asia during his lifetime. The material he brought forward from the archives was simply digested and explained by the great geographers. No other material existed. Important works of the missionaries had not yet appeared. No new journeys of discovery were undertaken into the land north of India. In all handbooks from the first half of the 19th century we meet the Chinese geography of Central Asia, — unless as in many cases, more confidence is paid to the classics, first of all Ptolemy. Humboldt himself says that the results for which we are indebted to European travellers are minimal as compared with the enormous extensions of the Central Asiatic ranges. »Ce sont les savans versés dans la connaissance des littératures chinoise, mandchoue et mongole qui, de nos jours, ont publié les notices les plus importantes et les plus complètes sur ces sujets.» [1] And he adds: »le tableau que j'ai présenté plus haut, des quatre systèmes de montagnes qui se dirigent de l'est à l'ouest, et dont le savant que je viens de nommer (Klaproth) a fourni une grande partie des matériaux, ne sera pas sans utilité.» [2]

Under such conditions grave mistakes could not be avoided. Humboldt had to make the best possible of the materials existing. Therefore such extraordinary passages as the following could be easily conceived:

»Le plateau de l'Iran qui, dans sa plus grande étendue de Tehran à Chyraz, paraît avoir une hauteur moyenne de 650 toises, envoie vers l'Inde et le Tubet deux branches, l'Himâlaya et la chaîne du Kuen lun, et forme une bifurcation de la fissure de laquelle les masses de montagnes se sont élevées. Ainsi le Kuen lun peut être considéré comme un débris saillant de l'Himâlaya. L'espace intermédiaire, comprenant le Tubet et le Katchi, est coupé par de nombreuses fentes dans toutes sortes de directions.»

Several years later Humboldt published in his remarkable work on Central Asia the results of his studies on Asiatic orography. He points out that the absolute height of the peaks is of far less importance than the direction and structure of the ranges, the age of the rocks and the relative situation of the plains and upheavals of the earth's crust. Afterwards the detailed work, as for instance the measurement of the absolute heights of peaks, has to come. In Himalaya the opposite

[1] Op. cit. p. 85.

[2] Again he points out the importance of the Chinese literature: »Dass die orographische Kenntniss Central-Asiens, welches von Europäern selten besucht worden, neuerlich so weit vorgeschritten ist, hat grossentheils seinen Grund in den schätzbaren Materialien, welche fleissige Männer der Chinesischen Literatur entnommen haben.» Central-Asien. Übersetz. Dr. W. Mahlmann. Berlin, 1844, p. 41.

has generally been done. Many peaks have been fixed long before the ranges to which they belonged were known.[1]

There were, as Humboldt shows, many causes which were in favour of the Chinese, if compared with Greek, Roman, Semitic and Indian geographical works: the wars in the western lands, the journeys of the pilgrims, the religious interest for mountains in combination with the sacrifices, and, finally, the compass. Therefore the Chinese sources are much more reliable than any other classic geographical works.

In the latter half of the 18th century the hypothesis arose that one tremendous plateau filled up the interior of Central Asia. It was the plateau of Tartary. This theory is now worked out by Humboldt in the following words:

»Ein beträchtlich hohes Plateau erstreckt sich sehr wahrscheinlich ohne Unterbrechung, in der Richtung von SSW nach NNO, von der kleinen Bucharei bis zu den Ost-Khalkas und zur Kette des Khangkai . . . Fügt man zu dieser Ausdehnung der Gobi noch das hohe Plateau von Tibet, welches davon durch die grosse Bergkette des Kuen-lun oder Kulkun geschieden wird, so erhält man, nach meiner Berechnung, vom Nordabhange des Himalaya bis zum Khangkai der Chinesischen Mongolei, d. h. vom See Manasa und dem tübetanischen Kaylas bis zur NO-Grenze der Gobi eine transversale Erstreckung von 250 Meilen oder eine Hochfläche von 60,000—62,000 □ Meilen. — Wenn man die Kette des Kuen-lun nach Süden zu übersteigt, so gelangt man zu den grossen und berühmten Erhebung des Bodens, welche den Raum zwischen dem Kuen-lun und dem Himalaya ausfüllt.»

He observes that those intrepid travellers who have crossed the Himalayas all agree that they reached the plateau of Tartary and he mentions the names of Andrade, Moorcroft, Desideri, Grueber, Dorville and Herbert. But if we compare all the existing European itineraries with the Chinese descriptions of the same regions, we shall be convinced that the Tibetan plateau-land is by no means a monotonous plain, but is, especially in its eastern parts, crossed by many ranges and mountain groups in different directions.

Such a conception, of course, holds good for the present day as well as in 1844. And it should be noticed, although Humboldt does not directly say so, that all that was known from European sources regarding the Plateau of Tartary proved to be wrong if compared with the Chinese material. All the Europeans made the same mistake, only the Chinese understood the plastic form of the highland and described it as crossed by ranges and mountain groups in different directions. Their great mistake was in not yet noticing the great general parallelism prevailing amongst the different ranges.

Thus the Chinese descriptions must be made responsible for the transverse range east of Manasarovar which Humboldt, although he has not marked it on his map, defines in the following words:

»Ein grosser Transversal-Gebirgsrücken, etwas östlich von den heiligen Seen Manasa und Râwana-hrada, entspricht durch seine Verlängerung gegen Süden einem Meridian, welcher die

[1] A. v. Humboldt: Central-Asien. Berlin 1844, p. 13.

Kolosse des Djawahir und Dhawalaghiri scheidet; dieser merkwürdige Rücken bildet die Wasserscheide von Tibet, indem die Gewässer auf der einen Seite zum Indus und Setledj nach Ladak (Leh) und Shipke, d. i. gegen NW., auf der andern Seite durch den Tsanpu nach H'lassa gegen SO. abfliessen.»

From the Chinese sources one could really get the impression that such a transverse range existed, specially as the water-parting between the Satlej and the Tsangpo could hardly be anything else than the mountain between the Langchen-kabab and the Tamchok-kabab. This transverse ridge had a long life to live. For it is mentioned so late as in 1904—5 by the Tibet Frontier Commission. I have shown already that such a meridional range does not exist. For what one sees when proceeding to the west in the valley of the upper Tsangpo is not a range, but only ramifications from northern and southern ranges, combined with the range south of Gunchu-tso, which also is stretching W.N.W. to E.S.E. Even here the parallelism is sharply marked out and there is no real meridional range. That Humboldt believed in its existence shows how insufficient his sources were. That Ryder believed in it proves that during the 60 years after the publication of Humboldt's great work, practically no new knowledge had been added. As far as I know no traveller had ever passed from the region of the source of the Brahmaputra to that of the source of the Satlej on the way which I used in 1907. And if any meridional range had existed here I should have had to cross it.

Humboldt in this work says the principal ranges generally stretch fairly parallel to the equator, that is to say in the great axis of the Asiatic continent. He enumerates the following: Altai, Tian-shan, Kwen-lun and Hindu-kush, Taurus and Himalaya, to which come the meridional ranges: Ural, Kuznezk, Bolor and Soliman. The Kailas he regards as a special range: »Die Kette des Kailâsa erhebt sich im Herzen des Tübetischen Plateaus selbst, nördlich von den Heiligen Seen. Dieser Name bedeutet kalter Berg, von kil im Sansk. Aber Kaîlasa bezeichnet jeden sehr hohen Gipfel.» Regarding the orographical situation of the Himalaya and Kwen-lun in relation to western systems he has arrived at the conclusion: »dass die wahre östliche Fortsetzung des indischen Kaukasus und der ganzen Kette, welche wir eben von der Westgrenze Persiens an untersucht haben, nicht im Himalaya, dem die Quellen des Ganges und der Dhawalaghiri angehören, gesucht werden muss, sondern in dem Gebirgssysteme des Kuen-lun oder Kulkun, welches im S. das Plateau von Khotan, im N. die Plateaux von Ladak und Tübet begrenzt.» Of the two branches into which the western system is divided further east, one, the Himalaya, is directed to the S.E. whereas the direction of the Kwen-lun is exactly the same as the direction of the Hindu-kush. Thus the Kwen-lun, the western part of which is called Thsung-ling, is the direct continuation of the Hindu-kush, and Himalaya is only a side-branch of the Hindu-kush; for here the principal question is about the continuity of the direction of an axis of elevation or upheaval. In Bolor or Belur-tagh he sees nothing else than the Imaus and this range gave rise to the belief in the existence

of a meridional range all the way up to the Polar Sea. But he adds: »Derselbe Name Imaus (Himavat, Schneeberge), welcher ursprünglich von den alten Geographen für einen Theil der grossen, von W. nach O. parallel dem Aequator streichenden Kette gebraucht wurde, ward späterhin auf einen Seitenzweig ausgedehnt, der gegen N. ablenkt und nach einer systematischen Fiction als Meridiankette das ganze Continent bis zum Eismeere abtheilen sollte.»

The following passage is, as will be seen, only partly correct:

»In den drei Tübets streichen die einzelnen Ketten, welche sich im Innern der Hochebene selbst erheben, allgemein in der Richtung eines Parallels. Es kommt mir keineswegs wahrscheinlich vor, dass die Idée der Meridiankette des Imaus der Alten, ein so langes und Jahrhunderte hindurch von den Karavanen nach Serica durchschnittenes Gebirge, von den Tübetanischen Ketten Dangbo, Kailas oder Karakorum-Padischah, welche höchstens in einigen Theilen SO.—NW.-Richtung haben, hergenommen sein kann. Auch führen uns die ältesten und authentischsten Stellen im Zend-Avesta, nach Hrn. Burnous, auf einen Imaus im Norden der Tübets, zu dem Bordj, 'Nabel der Gewässer, welche Ormuzd gegeben', der Quelle des Arg oder Jaxartes der Griechen. Der Bordj scheint diesem Gelehrten den 'westlichen Theil des Thian-schan oder Himmelgebirges der Chinesen' zu sein, und dieser Theil schliesst sich wieder an die *Meridiankette* des Bolor oder Belur-tagh an.»[1]

He speaks of the simplicity of the orographical structure of High Asia, where he finds four mountain-systems: Altai, Thian-shan, Kwen-lun (with the Hindu-kush and Elburz) and the Himalaya. They are separated by basins or, as between Kwen-lun and Himalaya by high plateaux, Ladak and H'lassa. The intermediate spaces between the four systems may also be characterised by lakes: Balkash, Lop-nor and Tengri-nor.

Only at so early a date could the word »simplicity» be used in connection with the most complicated mountain-systems on the earth's surface. On Humboldt's map they have, indeed, been very much simplified. There is no Pamir, Bolor takes its place as regular as though drawn with a ruler at a writing table. Amongst the great principal systems Kara-korum and Transhimalaya (Dzang) are not mentioned, as they were reckoned only as secondary ranges, situated between Kwen-lun and Himalaya. The Khor or Hor range is represented on the map as an apophysis from the Kwen-lun. It may be regarded as an embryonal form of the Kara-korum, which by Humboldt has thus been divided into two separate systems, of which the western is called Karakorum Padishah. This is an early stage in the development of the Kara-korum, as known to European geographers, and with pleasure we forgive Humboldt his mistake! Next to nothing was known about this system in his days. He hardly believed in its existence as will be seen hereafter. It is more curious that some 70 years later that part of the Kara-korum situated between $76^1/_2$ and 78° E. l. could be called the *Eastern* Kara-korum in the *Geographical Journal*, when all the material brought together since Humboldt's time was available. This is al-

[1] Op. cit. p. 118.

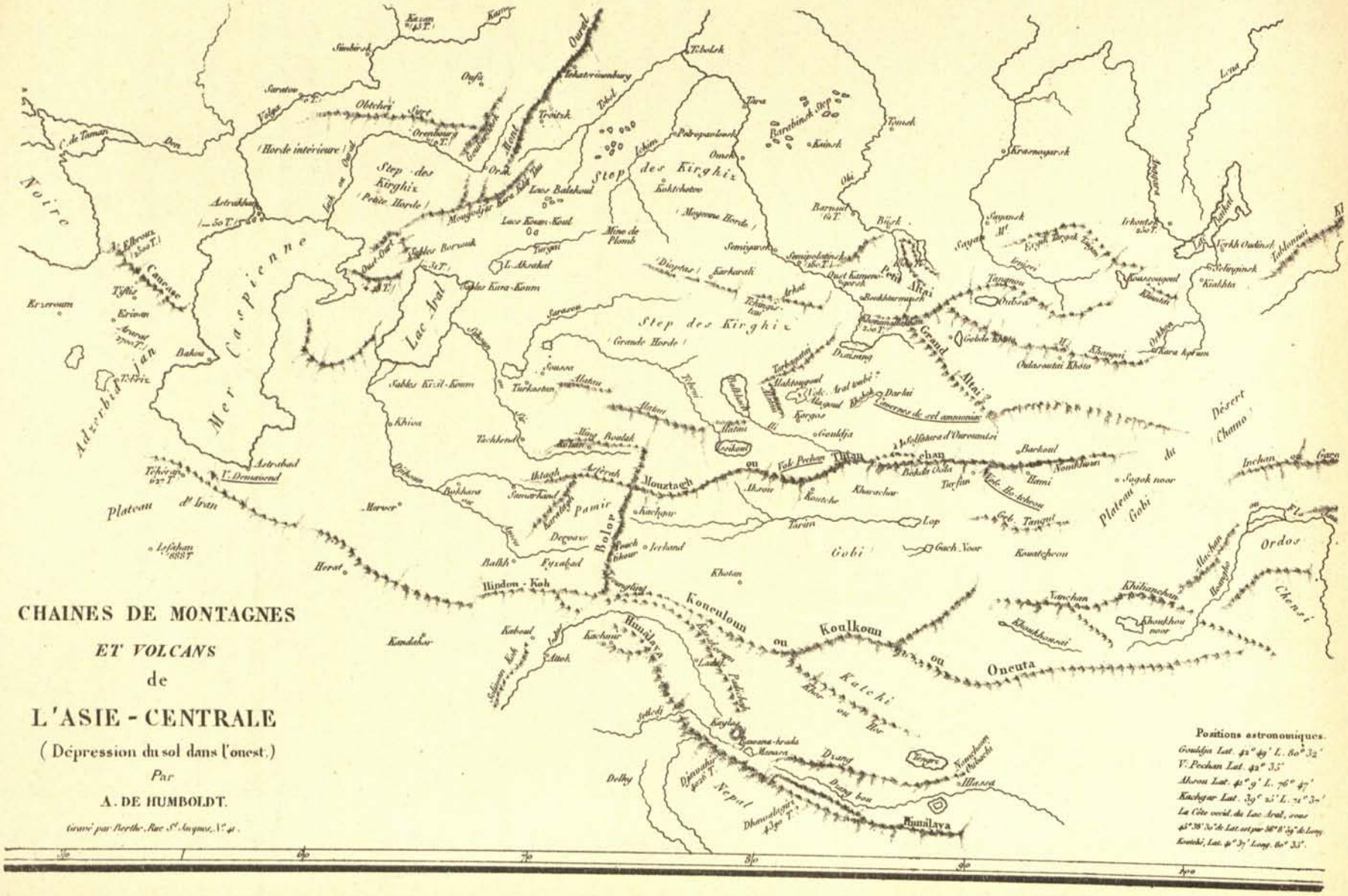
most the same as to deny the existence of a Tibetan continuation to the system, where Humboldt at least has his Khor or Hor range.

With our present knowledge the Tengri-nor is not more characteristic for the high plateaux between the Kwen-lun and Himalaya, than any other of the innumerable lakes, unless the fact that it is larger than the rest should be sufficient. And still Humboldt had at his disposal the Chinese maps and d'Anville. But he did not believe in them. He says that d'Anville's conjectures belonged to a time, in which the most confused and erroneous ideas prevailed regarding the mountain ranges of the plateau of High Tartary, the ranges running in all directions without the least order. So far as the Transhimalaya is concerned we have seen that this view happens to be correct. And still d'Anville's map is here more correct, generally, than Humboldt's. Both originate from the same initial sources, which have been far better understood by d'Anville than by Humboldt. D'Anville's map lets us suspect the existence of several different ranges as is indeed the case. Humboldt's map makes us believe in the existence of only *one* single range, the Dzang, north of the Tsangpo and south of Tengri-nor.

I have referred here to Humboldt's map of 1831 (Pl. VIII.) The one published in *Central-Asien*, 1844, is somewhat different. There we see a range: »Nubra oder Karakurum», and S.E. of it another called »Geb. Ghiang-ri», which is identical with the Gangri or Kailas. The lakes he calls Rawana-hrada and Mana-sarowar; the latter had been called Manasa on the earlier map. He has no channel between the lakes, but the Satlej issuing from Rakas-tal, where Moorcroft has been his authority. As Humboldt died in 1859 he lived sufficiently long to see the results of H. and R. Strachey's exploration.

The brilliant perspicacity of Humboldt could not be satisfied with the dogmas of the past, which with such obstinacy kept the new time in their spell and proved to be a hindrance to independent observation. But Humboldt to a certain extent exaggerated the value of his own orographical system, for he says:[1] »Ich verweile hier bei einer Erörterung, welche, wie ich mir schmeichle, den Schleier über einige für die historische Geographie interessante Verhältnisse in einem an grossen Erinnerungen so reichen Theil der Erde gelüftet hat.» Humboldt will always be given the honour of having brought order into the orographical systems of the interior of Asia. He drew the boundaries, Kwen-lun and Himalaya, for the Tibetan highlands, from which the knowledge of Kara-korum and Transhimalaya had to develop at a much later time. In the points in which he criticised d'Anville and Strahlenberg[2] he was wrong. If he had accepted them as he accepted Klaproth, his map would have been improved. His Dzang or Ghiang-ri range, is not a discovery of his own, nor the result of orographical or morphological conclusions, but simply a statement, which he, as did Ritter, borrowed from Klaproth.

[1] Op. cit. p. 119.
[2] Vide Vol. I, p. 251.



Humboldt, 1831.

Gen. Stab. Lit. Anst. Stockh.

CHAPTER XI.

RITTER ON THE RANGES OF TIBET.

In his beautiful *résumé* of the geography of High Asia as told in the old Indian religious books, CARL RITTER has shown that Meru included the whole plateau-land of the so-called High Tartary and Tibet. Three mountain ranges were situated north and three south of Meru. In the *Mahābhārata* they have got the following names: Himavan, Hemakutas and Nishadas, the best of mountains; Nilas the lazure blue, Svêtas the white and Sringavan the one of many peaks. The three last are the northern, the three first the southern, better known as situated nearer to India. For Himavan is Himalaya.[1]

»Dahinter liegen die beiden andern Bergreihen, Hemakuta, d. i. Berge mit goldglänzenden Gipfeln (hema, Gold, abgeleitet von hima, und kuta, Gipfel), und der beste der Berge ist kein anderer als der schwerzugänglichste, erhabenste Sitz der Götter, des tausendäugigen Herrschers, des Indra . . . . . Es sind überhaupt die höchsten, noch heute für besonders heilig gehaltenen und mühsam bepilgerten Höhen, des schneereichsten Hochgebirgs, welche bei dem Gebirgsvolke Kailasa das Paradies Siva's oder die Versammlung der Götter überhaupt heissen, um die erhabenste Gruppe der Alpenseen und hinter den unzugänglichsten Quellen der Ganges- und Indusströme.»[2]

But Ritter uses these old religious sources rather as an introduction to his own description of High Asia. For this he has more reliable sources, — the Chinese. The following extracts from his monumental work will show how far he knew the complicated orography of the country north of India. Starting from Kailas he says that from this mountain mass stretches to the N.W., north of Ladak, the range Karakorum-Padishah towards the Thsung-ling and, from the same Kailas, towards the east the snowy ranges Hor (Khor) and Dzang.

»Jene, die nördliche, die Hor-Kette, schliesst sich mit ihrem N.W. Ende an den Kuen-lun an, und läuft gegen Ost dem See Tengri Nor zu; diese, die Dzang-Kette, weit südlicher als jene, begrenzt das lange Nordufer des Dzangbo- oder Thsampu-Thales, giebt gegen Norden dem Tarku-Dzangbo (d. i. Grosser Fluss), der in den Tengri Nor fällt, seine Quellen und läuft von W. gegen O. der ungemein hohen Gletschergruppe Nien-tsin-tangla-gangri der Tübeter (auch Kentaisse älterer Karten) zu, die zwischen H'lassa und dem Tengri Nor einen merk-

[1] Compare Vol. I p. 17.
[2] Die Erdkunde von Asien, Band I, Berlin 1832, p. 11 et seq.

würdigen Grenzstein bildet. Weiter gegen N.O. zieht dies ungeheure Gebirge nordwestlich der Stadt Tsiamdo (Tschhang-tu) vorüber, die von drei Bergketten umgeben, von 2 Flüssen durchschnitten wird . . .[1] Die drei obengenannten Haupt-Ketten dieses Systemes gegen Osten hin, nämlich die äussere oder südliche, der Himalaya, und die innere oder nördliche, das Kaylasa, nämlich die Khor- und die Dzang-Ketten, diese drei, sagt Klaproth, stehen noch durch mehrere Zwischenketten in gegenseitiger Verbindung, die doch auch sehr hoch sind, und von denen mehrere noch an verschiedenen Stellen Gletschern tragen.»

When Ritter wrote the above passages no other journeys had been undertaken than Moorcroft's, Gerard's, Herbert's and a few others. The rest is from Chinese sources, translated by Klaproth. Ritter's range Hor stretches from the Kwen-lun in the N.W. to Tengri-nor and cannot be identified with any system of our present knowledge of Tibet. It cannot be the Kara-korum or rather its eastern continuation, as this is too far north. It cannot be the labyrinth of small ranges between the Kara-korum and the Transhimalaya, for this is also north of Kailas and Tengri-nor.

But the Tsang range we recognize from Klaproth's translations, and Nien-chen-tang-la dates from the same source. This is probably the first time that in a European handbook of geography the Chinese knowledge of the Transhimalaya has been introduced. In the statement that the Tarku Dzangbo should rise from the northern side of the Dzang range we again recognize the Chinese source. It is of great interest to remember that Carl Ritter, in 1833, introduces a range, beginning from the Kailas, bordering the northern side of the Tsangpo-valley, stretching from west to east towards the Nien-chen-tang-la south of Tengri-nor. Ritter thus regarded the Dzang as a range following parallel with the north bank of the Tsangpo, somewhat like the representation on the map of *Stieler's Hand-Atlas* for 1909, which is based on the map of the Tibet Frontier Commission of 1904. North of Dzang was another range, Hor. It is curious that Ritter did not prefer to accept d'Anville's view, whose map of Tibet is exactly 100 years older, and, from the point of view of general orography, more correct, as it would have induced Ritter to suspect not one or two ranges, but many ranges north of the Tsangpo, forming one great system all together. Still, Dzang is the oldest name used in Europe for the mountains north of the Tsangpo, and it should thus have a greater claim than the names Kailas and Gangri introduced at a later period.

Just as Saunders some 40 years later so did Ritter suppose the range Dzang to continue from Tengri-nor to the N.E. The last passage quoted above from Ritter represents, after Klaproth, the Himalaya, Dzang and Khor ranges as joined by secondary ranges, of which several should have glaciers. Or in other words that the whole of Tibet should be like a net of ranges, which is, as we now know, not at all the case, for the meridional ranges are very rare, and generally a great paral-

[1] Die Erdkunde von Asien Band II. Der Nord-Osten und der Süden von Hoch-Asien. Berlin 1833, p. 414 et seq.

lelism prevails, making the whole mountain-land north of India the most gigantic folded area of the earth.

Speaking of the Tibetan plateau-land Ritter says: [1]

»Wie weit sich nun diese Plateaulandschaft gegen den Norden hin herbreitet, darüber fehlen uns alle genauere Daten; wir haben indessen aus Moorcrofts Excursion von Leh gegen NO, zu der hohen Schneekette von Khotan, und aus den Angaben der Yarkend-Route über die Gletscherpässe der Karakorum-Kette zu vermuthen, dass sie sich dahinwärts keineswegs senkt, sondern eher noch hebt . . . Von einem grössern Absinken dieser Plateaulandschaft gegen Nord bis zur Kette des Kuen-lun-Systemes kann also wol schwerlich die Rede seyn, und die Gesamterhebung ist hier nicht nur erhaben, sondern auch lang und breit . . . .»

This view of the morphology of the Tibetan plateau-land is much clearer and more correct than that of Sir Henry Rawlinson, who, many years later, supposed the country was descending towards the north.

Ritter regards the high plateau-land of Eastern Tibet as stretching away, from the Manasarovar lake region between the mountain systems of Kwen-lun in the north, which separates the north-Tibetan and south-Turkish peoples, and the Himalaya of Nepal, Bhutan and Assam on the southern side. The following description of Tibetan morphology in its general features is a master-piece which would have been very useful for certain geographers of later times to remember, provided that they had ever known its existence:

»Es (das hohe Plateauland Ost-Tibets) wird zwischen diesen seinen nördlichen und südlichen Grenzketten, den 3:ten und 4:ten grossen Gebirgs-Systemen, als die dritte südlichste jener drei hohen Mittel-Ebenen Central-Asiens eingeschlossen. In mehr als doppelter Länge von W. nach O., als Breite, nimmt es einen ungeheuern, noch ungemessenen Flächenraum des erhabensten Plateaulandes, in dessen südöstlichsten Hälfte, in der Richtung der grössten Axenanschwellung des Ganzen ein. Aber dieser Raum ist durch viele, jenen beiden Hauptgebirgs-Systemen untergeordnete, grösstentheils parallele, oder nach Ost hin divergirende Gebirgszüge gegliedert, welche ebenfalls vorherrschend, wie der Lauf der zwischen ihnen in den Längenthälern fortziehenden Plateauströme, ihr Hauptstreichen von W. gegen O. haben, wie jene. Seine grosse Breite . . . . . ist durch diese Nebenketten wie durch so manche andere Nebengruppen vielfach verengt und gefüllt, und daher keineswegs als eine einförmige, ebene Fläche zu betrachten, sondern voll relativer Oberflächenwechsel. Ihre Längenthäler sind auch nicht etwa genau genommen jenen hohen Längenthälern zwischen der westlichen und östlichen Andeskette, wie Al. v. Humboldt gezeigt hat, zu vergleichen. Im allgemeinen wird aber dieser Raum durch einen vorherrschenden mittlern Hauptzug von Gebirgsketten, der zwischen H'Lassa und dem Tengri-Nor von W. nach O. durchziehend, im W. dieses Sees, Gangdisri (Oneouta), wo er sich nämlich westwärts dem Kailasa zum Manasarowara anschliesst, dagegen im Osten des Tengri-Nor aber Dzang-Gebirg heisst, in eine nördliche und eine südliche Zone von Plateau-Landschaften getheilt, von denen jene Katschi oder Khor Katschi genannt wird, weil sie von Hor oder Khor, d. i. von Mongolischen Stämmen bewohnt ist, diese aber Tübet, im engern Sinne, oder Süd-Tübet, im Gegensatz von jenem dem Nord-Tübet genannt werden kann, und das dritte Tübet der einheimischen. — Da von jenem nördlichen, dem Khor-Katschi Tübet,

[1] Op. cit. p. 591.

fast gar nichts bekannt ist, und es zu einer wahren Terra incognita gehört, so wird gewöhnlich wenn vom Tübet im Allgemeinen die Rede ist, nur diese südliche Zone gemeint.»[1]

Here Ritter points out the parallelism or the divergence towards the east. He recognizes the abundance of morphological detail and knows that the space between the principal ranges is filled up by secondary ranges. He regards the interior of Tibet as divided into two plateau-lands, Katchi or Khor Katchi in the north and Tibet Proper in the south, and the line of division is marked by a central gathering of mountain ranges, the western part of which is the Gangdisri, whereas the eastern part is the Dzang-mountains. The northern half he populates with Hor or Khor tribes of Mongolian origin, the southern is »the third Tibet» of the natives. This view should later on be adopted by one or two geographers, who perhaps, in a quite independent way, arrived at the same conclusion as Ritter; at any rate they do not quote him as their authority. Ritter, however, calls the northern region a »true terra incognita», and therefore he only believed it was inhabited by Mongol tribes. In reality the Gangdisri-Dzang or Transhimalayan system cannot be a boundary between nomads and sedentary, and still less between Mongols and Tibetans. For there are some temples and villages north of the system and many nomads south of it. Its great importance consists in its being a water-parting between the lakes of the plateau-land and the Tsangpo-Brahmaputra.

Thus we find that Ritter, although he made very little or no use of d'Anville, and only built up his geographical conclusions on Klaproth's translations, was perfectly persuaded of the existence of a long continuous range north of the Tsangpo. He was also a sufficiently sharp and perspicacious geographer to understand that the considerable tributaries of the Tsangpo, of which the Chinese texts spoke, could hardly be fed and rise in anything except high mountains. And as the Chinese texts directly described the Kailas, the Dzang range and the Nien-chen-tang-la, Ritter thought that an uninterrupted range must obviously exist north of the Tsangpo valley. His whole conception is Chinese, his sources we have quoted above; he only digested and brought order into the dry, matter-of-fact description of the Chinese and formed their material into a modern, scientific system of geographical morphology.

According to the *Wei-Tsang-t'u-chih* he places Kailas in the N.E. of the province of Ngari, and connects the four animal mountains with it, those of the Horse, Elephant, Lion and Peacock, and says that they stretch a distance of 48 geogr. miles or 800 li, — »bis zu dem Hochgebirge von Nga-ri — das ist also die sonst gänzlich unbekannte Nordkette.»[2] This »Northern range» is the Gangdisri-Dzang-Nien-chen-tang-la or Transhimalaya, which Ritter, in 1834, regarded as »wholly unknown». As Ritter absorbed every ounce of geographical knowledge of his time,

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[1] Op. cit. Band III, Berlin 1834, p. 173.
[2] Op. cit. p. 219.

and used eastern sources as well as western, it is of a certain value, when considering the history of exploration in the southern half of Tibet, to remember that the greatest authority of the period and one of the greatest who ever lived, calls the mountains of the part of southern Tibet where Transhimalaya is situated, an absolute *terra incognita*. And he arrives at that conclusion after an *exposé*, the principal features of which are in general correct. This proves that he was sceptical regarding the Chinese maps and texts. Or that he regarded their material as wholly unsufficient for the strict scientific geography of which he was the greatest representativ. Thus we may start again from the fact that in 1834 the existence of a Transhimalaya was, in geographical circles, regarded as pretty certain, although it was wholly unknown.

Of the southern range, south of the Tsangpo, Ritter says: »Dagegen zieht sich, als Südkette von da (Kailas) auf eine Strecke von 60 geogr. Meilen (1 000 Li), auf der Grenze gegen Nepal (Bhalbo), das Thung-la-Gebirge, dessen Gipfel sehr hoch und steil sind, dessen ungeheure Schneemassen, die dasselbe bedecken, niemals schmelzen; dies ist also die Nepalesische Himalaya-Kette mit der Dhawalagiri-Gruppe.» And between these two, the northern and the southern, and in the western part of the valley, is the source of the Tsangpo, which Ritter, in spite of Klaproth, has not the slightest doubt is the upper course of the Brahmaputra. But he regards even the Tsangpo as pretty unknown, and what else could be expected in 1834![1]

In the next chapter we shall have to return to Grimm's map of 1832, illustrating the Tibetan orography of Ritter.

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[1] He says. (Ibidem, p. 220): »Leider sagt das Wei tsang thou chy, ausser einer Notiz, dass alle Flüsse in Nga-ri, bis Dschaschi-lumbo im Sommer, wenn sie bei den grossen Wassern ausgetreten seyen, den gemeinsamen Namen Luhai, d. i. die Sechs Meere, führten, was wol auf ihre grossen Ueberschwemmungen hindeuten mag, nichts genaueres über diesen Hauptstrom des Landes. Diesen Mangel hat, was das Topische dieses hydrographischen Systemes betrifft, die bekannte und berühmte Arbeit Klaproths über den Lauf dieses Stromes und seine Identitet mit dem Irawaddi erzetzt . . .»

CHAPTER XII.

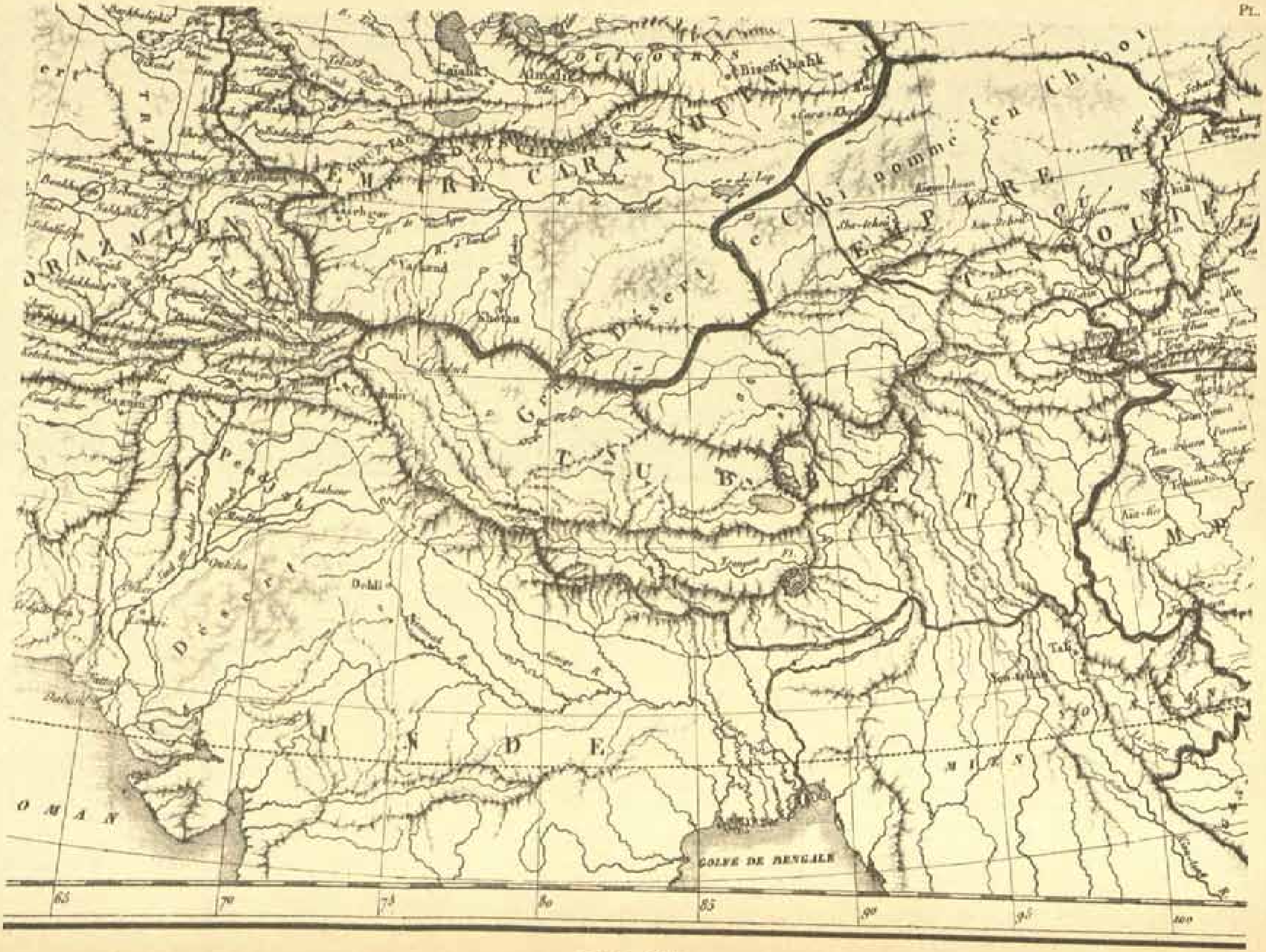
MAPS OF TIBET FROM 1820 TO 1850.

In the preceding chapters we have seen that Humboldt and Ritter derived their material on Tibetan orography from the information given from Chinese sources by Klaproth. We have also seen how great the difference was between Klaproth's original sketches of 1821 (Pl. IV and Pl. V) and his great map of 1836 (Pl. III). If therefore, Klaproth, had furnished the great geographers with the material they needed, he could, himself, after fifteen years, make use of the way, in which Humboldt and Ritter had brought the Chinese descriptions into harmony with the general laws of physical geography. But we shall also see that in many important particulars he was not in the least influenced by the two great geographers. On the contrary, for instance in the case of the Hor or Khor Range, he sometimes, interprets the original texts in quite an independent way. Only some 70 or 80 years later could these problems be cleared up by European exploration.

In this chapter I will show how Transhimalaya and other Tibetan mountain systems were represented on European, and more especially German maps, from 1820 to 1850. It is both impossible and superfluous to try to be complete in such a case as this. Klaproth's translations influenced all maps from this epoch, but were not always interpreted in the same way. For our demands it will be sufficient to discuss a few different maps showing how the conception has been changing.

In D'OHSSON's work[1] there is an excellent map of Asia engraved with a fineness and delicacy which are rare in our own time. Its title is *L'Asie au commencement du Treizième Siècle, Dressée par le Chr Lapie Géographe, 1824.* Pl. IX gives an idea of the southern part of LAPIE's map. Tubbet or Tibet is bordered on the north by the Kwen-lun system which on 80° East. longitude divides itself into two branches, one stretching E.N.E. to the regions north of Koko-nor, the other continuing south-eastwards in the direction of Tengri-nor. The upper Indus runs between two almost parallel ranges. The source-branches of this river are drawn

[1] Histoire des Mongols, La Haye et Amsterdam, 1834, Tome premier.



Lapie, 1824.

Gen. Stab. Lit. Anst. Stockh.

Stieler's Hand-Atlas N:o 43 c. Das Chinesische Reich mit den Schutz-Staaten und Japan, 1826.

in a rather unusual way, for the southern comes from a little lake north of the Kailas, the northern, which partly is marked with a dotted line, has its sources in the Kwen-lun and goes through the lakes Ike-namur-noor and Bacha-namur-noor, which for a very long time have occupied the N.W. corner on maps of Tibet. From the neighbourhood of the Kailas a smaller range stretches to the N.E. joining the Kwen-lun. The range of the left side of the upper Indus continues eastwards north of the Tsangpo and south of Tengri-nor, where it turns to the N.E. in the same manner as fifty years later on Saunders' map.

As Klaproth's results had not yet been published one wonders from where Lapie has drawn his information. But in his introduction[1] d'Ohsson gives us the sources: »La carte d'Asie, placée en tête de cette Histoire, a été dressée par M. le chevalier Lapie, d'après les meilleurs matériaux connus . . . L'Inde est extraite de la grande carte d'Arrowsmith et de plusieurs cartes particulières. L'Asie centrale est le resultat de plusieurs itinéraires, combinés avec les cartes russes: on se contentera de citer celui de Caschmir à Taraz, par Badakhschan et Khodjend, qui a jeté un grand jour sur des régions jusqu'ici presque inconnues . . . Le vaste empire de la Chine est extrait des cartes chinoises, appuyées sur un bon nombre d'observations astronomiques, et considérablement améliorées, à l'aide de nombreux itinéraires.»

Here Klaproth is not even mentioned. The material for Tibet is taken direct from d'Anville and the Ta-ch'ing map, the general features of which are easily recognisable. The only difference is that Lapie has joined all the source ranges of the Chinese maps into one, probably suggesting that the great river Tsangpo must be situated between two parallel ranges, just as the Indus is bordered by two ranges. This representation of the Transhimalayan mountains is a forerunner to the conception in later years exposed by Hodgson and Saunders. Lapie has no names for his mountains.

Two years later the map of Asia in *Stieler's Hand-Atlas*, (Pl. X), is probably the most important of the time. It has the title: *Das chinesische Reich mit den Schutz-Staaten und Japan. Entw. u. gez. v. C. G. R.* (Reichard). It is published in 1826. Here Tibet hardly seems to be a *terra incognita* at all. The whole area of the country is filled with mountains, rivers and lakes, although no other travellers than Andrade, the Capuchins, Grueber and Dorville had crossed it, and Moorcroft visited its S.W. part. There are three salient features in the physical geography: A tremendous mountain system in the heart of Tibet, the big lake Terkiri (Tengri-noor) and the river Tsampu correctly regarded as the upper part of the Brahmaputra. The part of the great mountain system which is situated south of Lake Terkiri, has no name but is the same as Nien-chen-tang-la. Many of the names are perfectly identical with those given by d'Anville 1733, but the general orientation is

[1] Op. cit. p. LXVII.

in many respects different from d'Anville's map. Where we should expect the Kwen-lun, there is a border range called Kentaisse Gebirge, although one cannot understand how that famous name could be given to it, remembering the fact that d'Anville, almost a hundred years earlier had marked Kentaisse at its right place. The country north of this range is called »Turfan, kleine Bucharey oder Ost-Dshagatai», and this country is obviously believed to be a high plateau-land.

The meridional range, culminating in Mus-tagh-ata, is called Mustag oder Kara-kurrum Gebirge, and the source of the river Schayuk is W.N.W. of Yarkand.

The great range of Lapie north of the Tsangpo has been split up in several mountain groups or irregular ranges more or less independent of each other and not at all reminding us of d'Anville.

Pl. XI shows a most interesting map of a part of Tibet, drawn by PH. VANDERMAELEN and published in Brussells 1827.[1] The south-western corner of this map is entirely taken from Moorcroft. The northernmost range of Tibet which ought to correspond to the Kwen-lun, is so far like Lapie's map that it divides into two branches going N.E. and S.E. Between the latter and the Kailas there is an interrupted diagonal range, or rather two mountain groups. The northern border-range continues to the west in Mus Tag or Kara Monts de Neige. Between the latter and Kailas is a meridional range probably a parent to Humboldt's and Ritter's N.W.—S.E. stretching range in the same region. Tarok-tso with neighbouring lakes and rivers, the upper Tsangpo with its tributaries, and the Targo-tsangpo with its lakes, are the same as on the Chinese maps. More curious are the mountains north of the upper Tsangpo and Raga-tsangpo, for they are not like any other map. There is no continuous range as on Lapie's map, but three very clumsy mountain groups quite independent of each other. Nothing could be more unlike the numerous small and narrow ranges of d'Anville's map, and we must regard these mountains as an attempt to reconcile the Chinese hydrography with general orographical laws.

We now come to the most interesting comparison, namely the one between the orographical systems and cartographical representations of KLAPROTH, HUMBOLDT and RITTER. The material I have to discuss is partly to be found on preceding pages. First of all, as a kind of foundation stone we have to consider Klaproth's Tibetan mountain systems of 1826.[2] He has three principal ranges: I, Himalaya, II, the range beginning from Kailas and stretching eastwards along the southern side of Tsangpo, III, the eastern continuation of the Kara-korum, which also comes in contact with the Kailas, stretches eastwards and includes the Nien-chen-tang-la. He

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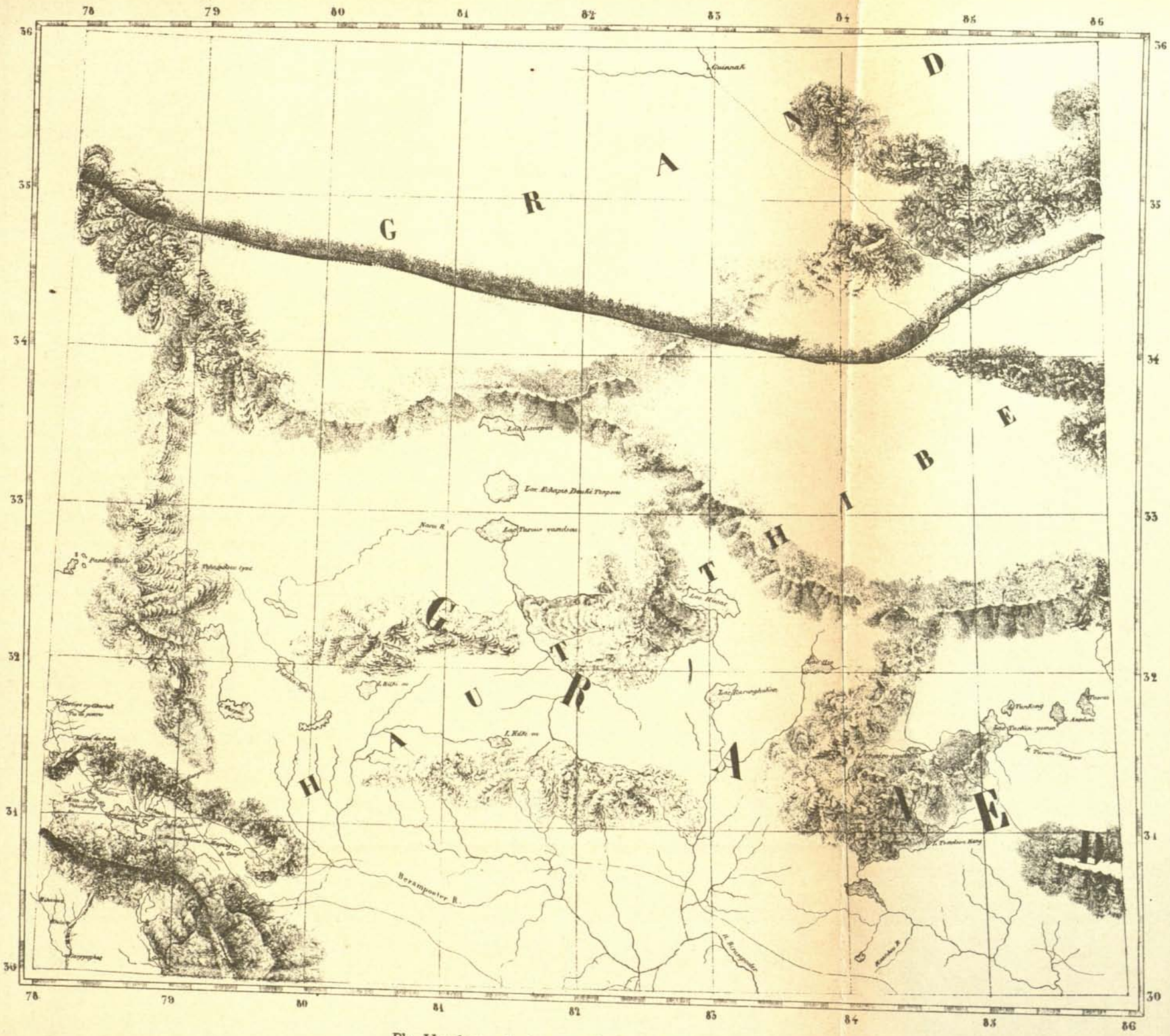
[1] From Atlas Universel de Géographie physique, politique, statistique et minéralogique. Sur l'échelle de $\frac{1}{1,641,836}$ . . . dressé par Ph. Vandermaelen, . . . II partie. Asie. Bruxelles 1827. This map was reproduced for me by the kind orders of Professor Meisner at the Royal Library of Berlin, where this map is signed: B 1070, N:o 69.

[2] Magasin Asiatique, Tome II. N:o III. Paris 1826, p. 134.



Ph. Vandermaelen's map of »Haut Thibet», 1827.

GEN. STAB. LIT. ANST. STOCKH.

Grimm's map illustrating the geography of Ritter, 1832.

has no Hor or Khor Range in his text or on his hand-drawn map (1821) and great map (1836).

Klaproth's third Tibetan range is the same which is called Zzang by Humboldt and Dzang by Ritter and corresponds to our Transhimalaya. Klaproth may be said to make three ranges start from the Kailas, namely the Kara-korum, the Zzang and the range south of the Tsangpo. Of these only the two first are to be found in Humboldt's system, whereas the third is not mentioned. The three ranges he makes originate from the Kailas are: I, Kara-korum, II, Hor or Khor, and III, Zzang. Of the Hor Range Humboldt says that its north-western end joins the Kwen-lun, while its eastern part stretches towards Tengri-nor. Now it is difficult to see how the range of Hor can start from the Kailas and, at the same time, touch with its extreme ends the Kwen-lun and the Tengri-noor. On the little map, *Chaines de montagnes et volcans de l'Asie-Centrale*, which Humboldt published in his *Fragmens Asiatiques*, 1831, there is also nearly the whole breadth of Tibet between the Hor Range and Kailas. On this map, Pl. VIII, only two ranges can be said to take their beginning from the Kailas, the Karakorum Padichah to the N.W., and the Dzang to the east. He has also indicated at least a part of Klaproth's range south of the Tsangpo. But the Hor Range belongs to quite a different part of Tibet and has nothing whatever to do with the Kailas. In this case Klaproth is much more correct than Humboldt.

Only one year later, or 1832, appeared Grimm's map illustrating Ritter's geography, and in 1833 Ritter's own description of the Tibetan orography. In both cases Humboldt's interpretation has been very carefully followed. Ritter has the same three ranges, Kara-korum, Hor and Dzang, starting from the Kailas.

On GRIMM's map,[1] Pl. XII, the principal ranges have got very much the same situation and configuration as on Humboldt's sketch, Pl. VIII. Only the Kwen-lun is more complicated. The Hor or Khor Range crosses Tibet diagonally from the Kwen-lun in the neighbourhood of Keriya to the region north of Tengri-nor. The Kailas is shown as a range situated between the two Indus branches. Its eastern continuation is called Gang-tis-ri, from which the Kara-korum starts to the N.W.

The eastern continuation of the Gang-tis-ri is a tremendous range slowly diverging from the Tsangpo valley, and bearing the following names: Tibetisches Gebirg Gang-dis-ri, Berg Tungdzei, Doosokbu Berg, Tomba-la, Nian-tsin-tang-la Gang-ri, Ga-tsian, Gebirg Samtan-gandza and Dzang Gebirg. The principal names are Gang-dis-ri and Dzang. The hydrography is taken from d'Anville's map. The situation of the sources of d'Anville's rivers decides the general direction of the great range. Only two of the northern tributaries to the Tsangpo, namely the Nauk-dzangbo and the Dzaka-dzangbo-tschu, which we remember from d'Anville, pierce

[1] Karte von Hoch-Asien, zu C. Ritters Erdkunde, Buch II, Asien, Th. 1 & 2. Bearbeitet von J. L. Grimm, Herausgegeben von C. Ritter und F. A. O'Etzel. Berlin 1832. (Massst. cirka 1 : 6,400,000). This map is taken from: Ritter and O'Etzel: Atlas von Asien.

the great range in transverse valleys. In this case, therefore, the Transhimalaya is shown as *one* very strong range, a new forerunner to the range of Hodgson and Saunders. It has only small ramifications, most of them on the northern side. The region between the Gang-dis-ri and the upper Tsangpo is represented as an elevated, comparatively flat plateau-land with a steep slope to the river at its southern edge. Only Buksiri is a small isolated range, N.N.E. of Shigatse. Along the southern bank of the Tsangpo there is sometimes a double mountain system situated.

The Tsangpo is correctly shown as coming from Damtschuk Kabab (Tamchok-kabab, though this mountain has assumed a rather unusual form. The source branches have not at all been improved from d'Anville. The source of the Indus is comparatively well placed, and the source of the Satlej is perfectly correct; even the Tage-tsangpo may be suspected on Grimm's map.

It seems indeed curious that a map of Tibet from 1832 can be quite filled up with detail. There are scarcely any white patches at all, everything seems to be known, even the names of mountains, rivers and lakes. And still there is nothing that depends upon European researches, except a few names from Georgi's book. All the rest is Chinese, and at a few places the interpreters' names are put within brackets (d'Anv., Klapr.). D'Anville has here played the same part as Ptolemy formerly did, but on a smaller scale both as regards time and space.

Comparing Grimm's map of 1832 (Pl. XII) with Klaproth's map of 1836 (Pl. III) we find that the hydrography is about the same in both cases, but that the mountain ranges, except Himalaya and Kara-korum, are very different. Instead of Grimm's and Ritter's range of Dzang which stretches from west to east as one very regular wall, Klaproth's »third chain», between the Kailas and the »Niantsin tangla gangri» is very irregular, and, in its eastern part, broken up into several ranges and ramifications. From this point of view, and especially regarding the Nien-chen-tang-la part of the Transhimalaya, Klaproth's map is by far superior to Grimm's.

Pl. XIII is a reproduction of Tibet as shown on H. BERGHAUS' map of Asia, published in 1843.[1] It should be compared with Grimm's and Klaproth's maps. It is easy to find out the resemblances and differences. I will only point out that Berghaus has rejected the Hor or Khor Range completely. The hydrography is the ordinary Chinese one. The orography of the Transhimalayan system is exactly the same as on Klaproth's map, though the method of drawing is somewhat different. He has one mighty head-range with many ramifications to the north and south. As he has followed Klaproth's orography, his map is much better than Grimm's.[2] Berghaus also follows Klaproth's example in not giving the Transhimalayan mountains one common name. He has the same names for different parts of the system like Klaproth, only changing the spelling from French into German.

[1] This is a part of Blatt 2 (China und Japan) in Berghaus, Atlas von Asia, Gotha, Justus Perthes, 1843.

[2] Compare Berghaus' map of 1834 in Stieler's Hand-Atlas Vol. II, Pl. XXII.

H. Berghaus' map of Asia, 1843.

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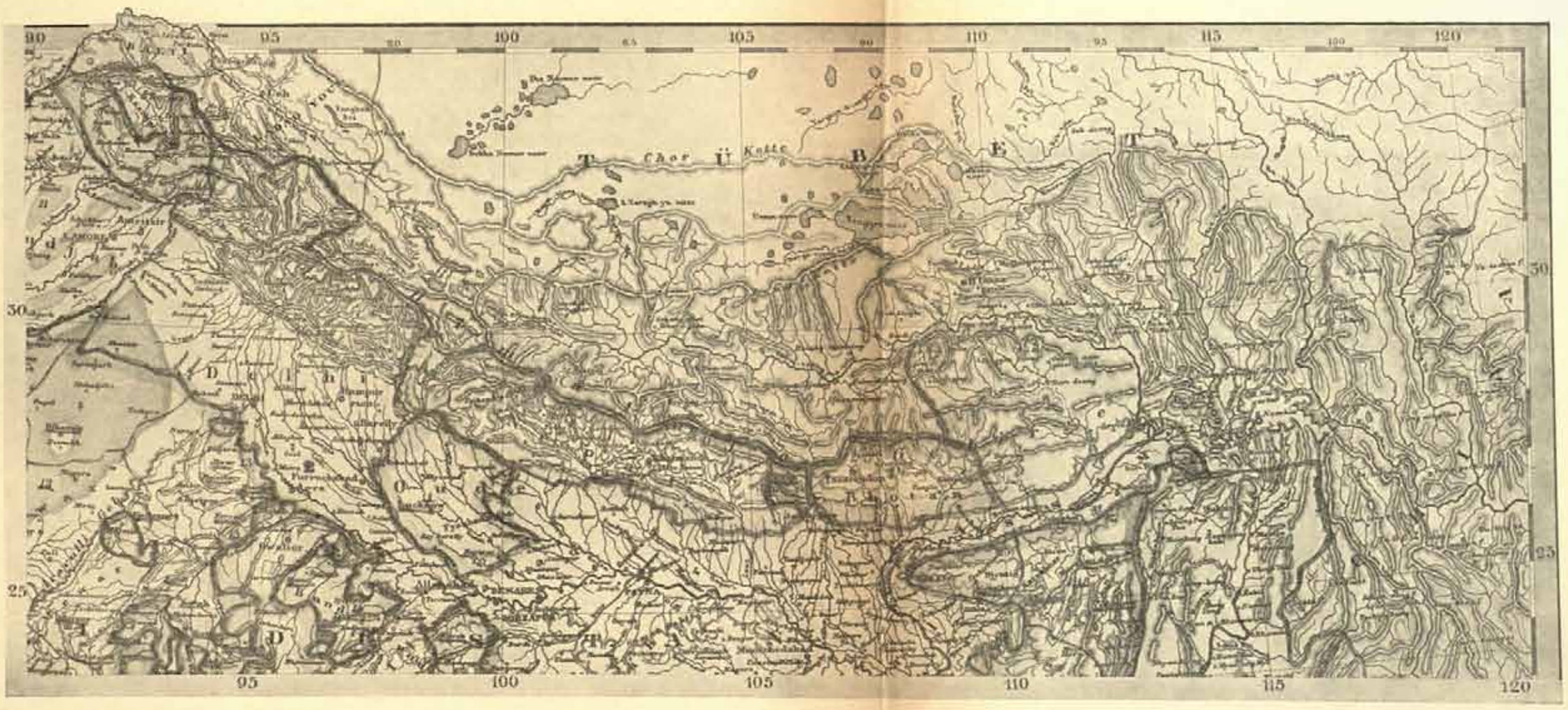

Stieler's Hand-Atlas N:o 44 b. Vorder-Indien oder das Indo-Britische Reich, 1849.

Finally it will be sufficient to reproduce the map of Tibet in *Stieler's Hand-Atlas* for 1849,[1] Pl. XIV. The Transhimalayan orography is of the same type as on Klaproth's map of 1836 but in fineness of drawing cannot be compared with it. The range which from a point just north of Tengri-nor stretches westwards, was also to be found on Berghaus' map and is taken from Klaproth. But whereas they did not give it any special name, STÜLPNAGEL has now adopted the »Chor Kette», or the Hor or Khor Range of Humboldt and Ritter. But the difference between it and Humboldt's Khor or Hor (Pl. VIII) is very great indeed. The representation as introduced by Klaproth and followed by Stülpnagel is of course much more like reality than Humboldt's construction. Huc's journey of 1844—46 could not at all improve the map, for his narrative was not published until 1853. But even after that year it has not changed the map, as can be seen on the edition of *Stieler's Hand-Atlas* 1861. Still, the »Chor Kette» on Stülpnagel's map is a very interesting divination of a great orographical feature, which I believe is perfectly correct, though neither the first draughtsman of this range, Klaproth, nor his followers, could have the slightest idea of his meaning. For, as I shall try and show in the fourth volume of this work, the northern Kara-korum Range must be supposed to continue through the whole of Tibet, sometimes interrupted, sometimes rising again to considerable elevation and finally appearing under the form of Abbé Huc's Tang-la. The Chor Kette may be regarded as a forerunner of this gigantic fold in the earth's crust.

[1] Vorder-Indien oder das Indo-Brittische Reich. Entworfen und gezeichnet von F. von Stülpnagel. Stieler's Hand-Atlas, N:o 44[b], Gotha, Justus Perthes 1849.

CHAPTER XIII.

BRIAN HODGSON AND THE NYENCHHEN-THANGLA CHAIN.

In the preceding chapters we have seen that the Lama survey during some of the last years of Kang Hi's reign which was used by d'Anville for his map of 1733, was really the first serious attempt to represent the complicated labyrinth of mountains and systems situated to the north of the Tsangpo. The next attempt, the Ta-ch'ing map, discussd by Dutreuil de Rhins, proved to be, so far as the orography is concerned, as unsatisfactory as d'Anville's. In the Chinese texts we found very little about these mountains. Everything that was known had been translated by European scholars, chiefly Klaproth, though he could not, of course, give more orographical detail than the Chinese texts. What he brought was, however, used in geographical compilations, amongst which we found Humboldt and Ritter to be the most important. They mentioned two different ranges: the Dzang immediately north of the Tsangpo, and the Khor or Hor further north. From the standard works of the two great German scholars the two ranges were introduced into all geographical works and maps of their time and remained even many years after their death. Thus, for instance, we find them on the map N:o 44 b, *Stieler's Hand-Atlas* of 1861 (Pl. XXVII), drawn by HERMANN BERGHAUS. The northern one is called Chor Kette, the southern Zsang Kette. On PETERMANN's edition of the same sheet, 1875 (Pl. XXVIII), the northern range is unchanged but has no name, whereas the southern is called Tsang Geb., and considerably changed according to Nain Sing's then fresh discoveries. In later editions, for instance the one of 1904 (Pl. XXX), the two ranges have disappeared completely, — only Nien-chen-tang-la between Khalamba-la and Dam-largen-la is left.

The Pundits of later years only touched the perific parts of the mountain region in question. NAIN SING has practically gone round it on all sides. Where he crossed it in the east, south of Tengri-nor, it was later on again traversed by LITTLEDALE and DE LESDAIN. In 1904 the Tibet Frontier Commission followed exactly the same way as Nain Sing. RYDER and WOOD made their beautiful map and triangulated the peaks so far as they could be seen, that is to say those which are in the immediate neighbourhood of the Tsangpo. Travelling from Tengri-nor to Dangra-yum-tso Nain Sing took bearings to some peaks he saw in the south. One could believe in the existence of two ranges, for between Nain Sing's and

Ryder's and Wood's peaks a considerable space was left blank on the maps. FERNAND GRENARD seemed to be right when, on his map of 1899,[1] he entered two long and parallel ranges, sending out several ramifications to the north and south.

The Chinese sources, which, up to 1906 were the only ones of real authoptic authority, as far as the orography of the Central Transhimalaya is concerned, gave a great number of small ranges in all directions of the compass. Ritter and Humboldt joined them to *one* great range. On German maps both these kinds of orography were reconciled with each other: one principal range with smaller ramifications in different directions. On English maps the representation of Ritter and Humboldt was given: only one great range without ramifications. Such was the case even on maps published after Nain Sing's journey of 1873—74. But nobody existed who could tell whether the mountains, which obviously were situated north of the Tsangpo exhibited the general morphology as given by the Chinese, or as given by Ritter and Humboldt. This was impossible even in 1905. Nobody was able to tell whether these mountains were a continuation of the Kara-korum or not. But in England, as late as in 1882, there were geographers who believed they knew that the Nien-chen-tang-la turned off to the N.E., in the direction of Tsaidam, — although already ten years earlier PRSHEVALSKIY on his first great journey had proved that if such a range existed, it would have to cross a series of gigantic mountain systems at right angles.

I was fortunate enough to solve this old and obstinate problem definitely during my journey of 1906 to 1908. I crossed the unknown regions of Central Transhimalaya on eight different lines and was able to get an idea of its general orography. My journey therefore put an end to the speculation which, originally founded upon Chinese information, showed itself in so many different shapes in Europe. I have already discussed the important contributions of Klaproth, Humboldt and Ritter. After them a few other geographers, chiefly English, have also paid some attention to the mountains north of the Tsangpo. One of the most prominent of them was BRIAN HODGSON, whose name is familiar to everybody who has studied historical, linguistic or ethnological matters and natural history in India. As Brian Hodgson is probably one of the first Englishmen, if not the first scholar after Ritter and Humboldt, who has tried to disperse the dark clouds which have always veiled Transhimalaya from the eyes of European knowledge, I have thought it worth while to examine his geographical methods regarding the great mountains north of India. I do so with so much the greater pleasure as Hodgson is a *connaissance à faire* and his map of the Himalayan and Transhimalayan mountains, printed in 1857, could give rise to supposition that during his many years' life in the Himalayas, he had perhaps obtained some important information about the mountains in Southern Tibet. Further it would be interesting to know whether Hodgson's representation of the

[1] Carte de l'Asie Centrale etc. Drawn by J. Hansen.

Transhimalaya, simply reflected his own personal opinion, or whether it was a conception he had inherited from Ritter and Humboldt. If his Transhimalaya, or as he calls it, Nyenchhen-thangla, originated from himself and the information he could have collected from natives, it would of course be of much greater value and interest, than if it were simply an imitation of the great German geographers' maps, for in the latter case he would only be an epigon and a new link in an old chain. At any rate Hodgson claims an honourable place in the history of exploration in the Transhimalaya mountains.

Brian Hodgson was born in 1800, went out to India in 1818, came to Nepal in 1820, was Assistant Resident there from 1825 to 1833 and Resident 1833—43; 1845—58 he lived in Darjiling and returned, 1858, for good to England, where he died 1894, after a life of restless, indefatigable and brilliant work both as a scholar, diplomatist and politician.

His life was published two years after his death by Sir WILLIAM HUNTER.[1] It is a work of some 380 pages, written with knowledge, love and admiration. All the innumerable articles published by Hodgson on different subjects during the course of his long life are given in a list with titles and dates. We are told that during his first 25 years in the Himalaya he had seldom »a staff of less than from ten to twenty persons (often many more), of various tongues and races, employed as translaters and collectors, artists, shooters, and stuffers».[2] Sir JOSEPH HOOKER, was materially influenced in his studies by Hodgson and speaks with the greatest admiration and gratitude of the advantage it was to be welcomed to the Himalaya by such a man. Hooker says: »I arrived at Darjiling in the spring of 1848. Hodgson received me cordially, and invited me to make his house my headquarters; to share his table and make every use of his valuable library, which was rich in works relating to the Himalaya, Nepal, and Tibet. Thus I had the advantage, at the outset of my explorations, of the counsel and hospitality of the man who was facile princeps in respect of knowledge of the Eastern Himalaya, its peoples, products, and natural history.»[3] Hodgson's »Nepal life would have been almost equally one of solitude but for the society of the most intellectual of the high-caste Nepalese of the Court, and of the learned Lamas of Kathmandu and especially of Tibet, the latter of whom made frequent visits to him in Nepal.» In Darjiling he studied the Races of Northern India and their languages, the physical geography of the Himalaya and Tibet, the zoology, especially the ornithology of Sikkim.

After having spoken of Hodgson's intercourse with Humboldt, Hooker relates the following interesting recollection: »This leads me to the subject of the Physical Geography of the Himalaya, upon which our discussions were long and often animated, for we differed considerably in our conceptions of the structure of the chain

[1] Life of Brian Houghton Hodgson, British Resident at the Court of Nepal. London 1896.
[2] Op. cit. p. 244.
[3] Op. cit. p. 249.

and its relations to the geography of the countries adjacent to it. His own conclusions were communicated to the J. A. S. B. whilst I was still in Sikkim, in a very remarkable and learned essay, wherein the whole subject of the mountain and its river-systems, peoples, and productions is treated with a fulness of knowledge of which I had not a fraction.»

Sir William Hunter has also an interesting passage on Hodgson as a geographical scholar: »Hodgson had also the good fortune to supply materials for the solution of the river problems of Northern India itself. It is known that the three mighty river systems of the Indus, the Sutlej, and the Brahmaputra take their rise near to each other, not on the Indian side of the Himalayas but on the northern or Tibetan side. During the first eight hundred miles of their course the Indus and Brahmaputra are essentially rivers of Central Asia, with the vast ranges of the Himalayas between them and India. But while thus rising on opposite sides of the same sacred mountain, the Indus turns westward and forces a passage through the Western Himalayas into the Punjab, and so eventually to the Arabian Sea. The Brahmaputra, on the other hand, turns eastward from its source, and eventually bursts through a gorge of the Eastern Himalayas into Assam, and so reaches the Bay of Bengal on the opposite side of India. Its course of eight hundred miles along the Tibetan or Central Asian trough on the north of the Himalayas still remained unexplored when Hodgson wrote. It was only known that a great river called the Sanpu flowed eastwards along the Central Asian trough, while a great river called the Brahmaputra burst through the Eastern Himalayas into Assam. Indications that these two rivers formed different sections of the same stream were not wanting. But they were not complete. Hodgson's inferences while in Nepal, and the geographical details which he supplied, raised these indications almost into proof. The evidences of the Sanpu and the Brahmaputra being one and the same river, wrote Pemberton in 1839, 'are greatly strengthened by Mr. Hodgson's MS. map forwarded to the Surveyor-General. I consider this so satisfactory that nothing but ocular demonstration to the contrary could now shake my conviction'.» [1]

There is not a word about the Nien-chen-tang-la or the mountains north of the Tsangpo in the whole book. If during his long and restless life Brian Hodgson had contributed in any remarkable way to our knowledge of this system, — if he had found a description of it in some of the manuscripts he sent to Europe or if he had heard it described by some of his friends in Nepal, Sikkim or Tibet, if by any means he had proved the existence of a continuous mountain system north of the Tsangpo, such a feat would certainly not have been omitted in a book on his life's achievements.

In order to settle the matter we have nothing else to do than to return to Hodgson's own original works on geography, to make sure whether, in a more

[1] Op. cit. p. 287.

direct way than d'Anville and Klaproth, he had been able to contribute to our knowledge of the Transhimalayan mountains. At the same time I will also touch upon some problems of physical geography which belong to the Himalaya and the road to Lhasa.

Concerning the road to Lhasa, Hodgson has communicated an itinerary by a Kashmiri Bhotia, AMIR.[1] His 13th stage took him to Tingri, at the extremity of which is the village of Langur, tenanted by Bhotias, and consisting of seven or eight houses. Here is also a river going east and then north to Kerung which finally reaches Digarchi. The travellers' passports are examined at Langur.[2] »Tingri is a respectable town of Bhotias — and in the centre of it is an elevated and detached spot, wherein dwell a considerable number of Chinese. At Tingri commences a line of post, maintained by horses, and stretching viâ Digarchi and Lahassa to China. The winter is intensely cold at Tingri. The periodical rains extend there, and are sometimes unusually severe, so that it rains incessantly for a week.»

The 16th stage takes the traveller to Chang-Larché (Lhatse-dsong). »East of the city passes a river, which, flowing northwards, falls into the river of Digarchi.»[3] The 17th stage is Phinju-Ling, and the next day, after 3 *cos*, he comes to a village called Tangsu-Chambu:[4] »By the village flows a river called Di-chu, proceeding from south to north. This river has a great breadth and violent current, and is crossed by the traveller at a ferry close to the village, upon which ply two ferry-men.» The 19th stage is Dungá-sètu, and the next Sákya, which is not on the high road. The following stages are: Chárúng, Nátán, Teshú Lhambu and Digarchi. Then follows, on the way to Píná, the river Chúrr-Erku east of Digarchi; course from N. to S. (!). Then: Kyángzhé, Rillúng, Zarrah and Lagánché:[5] »South of the village is a vast lake, in truth, an ocean called Yamzú. There are three rocky isles in the lake . . . The water is extremely salt and bitter.» The 28th stage is Paité. The next is Kambha: »Eight cos in advance of Paité you journey over a plain, and then reach the base of a mountain called Kambhal, the ascent of which is one and a half cos. On the top is a spring of excellent water. The descent of the mountain is three cos, and at the bottom of it lies the village of Kambha, of about one hundred houses, tenanted by Bhotias, and two Chinese. The latter are soldiers, and superintend the royal Dâk.»

The 30th stage: 2 *cos* to »a mountain called Chakshamchu-Arí . . . Beneath the mountain flows a river called Yékó-Chángó.[6] Its waves are very large — and

[1] Route from Cathmandu in Nepal, to Tazedo, on the Chinese Frontier. Asiatic Researches, Vol. XVII, Calcutta 1832, p. 513 et seq.

[2] It is curious to find this name for a village in the very region where the old missionaries talk of the mountain Langur or Himalaya.

[3] The traveller says east instead of west and seems to believe that the Raga-tsangpo is the main river.

[4] Tamchok-kamba, or Tsangpo.

[5] Nagartse-dsong. The following names are very easy to recognize.

[6] Chaksam, Ngari-chu, and Yere-tsangpo.

A FAC SIMILE OF "A SKETCH MAP OF THE PRINCIPAL NATURAL DIVISIONS OF THE HIMALAYA" BY B. H. HODGSON ESQ. 1857.

Hodgson's map of 1857.

Geh. Stab. Lit. Anst. Stockh.

its course from the east to the west (!). Then Chûshér, Chabná and the city Chang», »south of which flows the river Yékó-Chángó, before mentioned. Two *cos* from Changé »is a mountain over which you pass». At its base is the village of Nám. The 34th stage goes to a mountain, Láchain-Lachún. »In this stage you again see the Yékó-Chángó river. Then Nitáng, and Thi-sambar. The 36th stage: Lahassa, first passing Bírbum, situated at the base of a mountain called Kimbú.»

At the time when it was published, 1832, this itinerary was no doubt of great interest. The traveller seems not to have had any gift for understanding rivers and their directions.

The following description of the general orography of the Himalaya may serve as a contribution to Hodgson's characteristics as a student of physical geography.[1] His map of 1857 (Pl. XV) gives a good idea of the subject. Already the introduction is interesting: »The details of Geography, ordinarily so called, are wearisomely insignificant; but the grand features of physical geography have a pregnant value, as being alike suggestive of new knowledge, and facilitative of the orderly distribution and ready retention of old. — I had been for several years a traveller in the Himalaya before I could get rid of that tyranny of the senses which so strongly impresses almost all beholders of this stupendous scenery with the conviction that the mighty maze is quite without a plan. My first step towards freedom from the overpowering obtrusiveness of impressions of sense was obtained by steady attention to the fact that the vast volume of the Himalayan waters, flows more or less at right angles to the general direction of the Himalaya, but so that the numberless streams of the mountains are directed into a few grand rivers of the plains, either at or near the confines of the two regions.» He shows »that the great peaks bound instead of intersecting the alpine river basins, and that, in truth, the peaks by so bounding create the basins, whereas their intersection would destroy them.» On these principles he represents a series of well defined basins on his map. There, he says, it will be seen »that the lateral barriers of the river basins are crowned by the pre-eminent Himalayan peaks, that the peaks themselves have a forward position in respect to the ghát line or great longitudinal watershed between Tibet and India, and that from these stupendous peaks, ridges are sent forth southwards proportionally immense». He describes the different ridges sent forth from different peaks and separating the waters of the Kosi, Tista, Gandak, Karnali, Ganges and Jumna from their neighbours. The general conclusion is: »It is inconsistent with all we know of the action of those hypogene forces which raise mountains, to suppose that the points of greatest intensity in the pristine action of such forces, as marked by the loftiest peaks, should not be surrounded by a proportionate circumjacent intumescence of the general mass; and if there *be* such an intumescence of the general surface around each pre-eminent Himálayan peak, it will follow, as clearly in logical sequence as in

[1] »On the Physical Geography of the Himalaya.» Journal Asiatic Society Bengal, Vol. XVIII, Part II, 1850, p. 759 et seq.

plain fact it is apparent, that these grand peak crowned ridges will determine the essential character of the aqueous distribution of the very extended mountainous chain along which they occur at certain palpable and tolerably regular intervals.»

The article is full of suggestive theories in physical geography and touches many other problems of natural history. It shows an author of unusual perspicacity and clearsightedness. The map, partly the same as Pl. XV, has nowdays only the value of being a document in the history of Himalayan cartography. Its almost geometrical regularity of the relations between Himalayan orography and hydrography has in later times been succeeded by a much more complicated system of ridges and rivers. On his map he has drawn the head ranges and the transverse ridges with the high peaks but not the watershed between the Brahmaputra and Ganges. He includes the Yamdok-tso within the drainage area of the Indian rivers, although already the Lama surveyors and Klaproth on his map of 1828[1] knew that the lake formed a self-contained basin and the Kashmiri Amir, whose itinerary he had published some 18 years earlier, had described the lake as salt. If he had examined the materials existing, he would never have represented the Manas river as beginning from the Yamdok-tso.

In a third article by Brian Hodgson the Nien-chen-tang-la appears.[2] The subject is chiefly linguistic but the indefatigable author also gives some geographical hints: »Hórsók is a compound Tibetan word by which the people of Tibet designate the Nomads who occupy the whole northern part of their country, or that lying beyond the Nyenchhen-thánglá range of mountains, and between it and the Kuenlún chain. Hórsók designates the two distinct races of the Hór and Hórpa and the Sók or Sókpa, neither of whom, so far as I have means to learn, is led by the possession of a native name at once familiar and general, to eschew the Tibetan appellations as foreign . . . The Hórpa occupy the western half of the region above defined, or northern Tibet; and also a deal of Little Bucharia and of Songaria, where they are denominated Kao-tsé by the Chinese, and Ighúrs (as would seem) by themselves. The Sokpa occupy the eastern half of northern Tibet as above defined, and also, the wide adjacent country usually called Khokho-núr and Tangút by Europeans, but by the Tibetans, Sokyeul or Sokland. In southern Tibet, or Tibet south of the Nyenchhen-thánglá chain, there are numerous scattered Hórpas and Sókpas, as there are many scattered Bodpas in northern Tibet; but, in general, that great mountain chain, the worthy rival of the Himálaya and the Kuenlún, may be said to divide the nomadic Hórpas and Sókpas from the non-nomadic Bodpas or Tibetans proper. Though the major part be Buddhists, yet there are some followers of Islam among

[1] Mémoires Relativs à l'Asie, III, p. 416.

[2] »Sifán and Hórsók Vocabularies, with another special exposition in the wide range of Mongolian affinities and remarks on the lingual and physical characteristics of the family.» Journal Asiatic Society of Bengal, Vol. XXII, 1853, p. 121.

the Hórpas and Sókpas of Tibet; more beyond the Tibetan limits. They are all styled Khachhé by the Tibetans . . .»

Regarding the Nien-chen-tang-la Hodgson says in an explanatory note:[1] »This important feature of the geography of Tibet is indicated by the Nian-tsin-tangla of Ritter's Hoch Asien and by the Tanla of Huc. I have, following native authority, used in a wide sense a name which those writers use in a contracted sense; and reasonably, because the extension, continuity and height of the chain are indubitable. Nevertheless Ritter and Guyon have no warrant for cutting off from Tibet the country beyond it up to the Kuenlún, nor are Katché and Khór the names they give to the country beyond admissible or recognised geographic terms. Khór, equal Hór, is purely ethnic, and Katchi is a corruption of Kháchhé or Mahomedan literally, big-mouth.»

So far as geography is concerned there is not a word in the quoted passages which had not been said 20 years earlier and explained in a more detailed and systematic way by Ritter.

Hodgson tells us that between Nien-chen-tang-la and Kwen-lun the northern part of Tibet is inhabited by nomads. The western half is occupied by the Horpa, the eastern by the Sokpa. They are divided from the Tibetans proper by the Nyen-chhen-thánglá. The country south of the same range is called Southern Tibet. The great mountain chain of Nyenchhen-thánglá is the worthy rival of the Himalaya and the Kwen-lun.

As quoted above Ritter says,[2] that in the interior of Tibet there is a great series of mountain ranges, stretching »between H'lassa and Tengri Nor from W to E, and west of this lake it is called Gangdisri, i. e. where it joins, in the west, the Kaylas at Manasarovar, but east of Tengri nor, it is called Dzang-mountains». The great portion of Tibet which is crossed by this system, »is divided in a northern and a southern Zone of Plateau-landscapes, of which the former are called Katschi or Khor Katschi, because they are inhabited by Hor or Khor, i. e. Mongolian tribes, — the latter is called Tübet proper or Southern Tübet, in contradistinction to the former which may be called North-Tübet.» Klaproth also divides the Mongolians west of China into »Mongols du Koukhou noor» and »Mongols appelés Khor, au nord du Tubet».[3] On his map N:o 27 of the Atlas belonging to the *Tableaux historiques* he has even sketched the boundaries of the two peoples and enterd the legends: »Mongols de Khor Ka-tchi» and »Mongols de Khoukhou-noor». They are called Sokpo by the Tibetans. On his map N:o 26 he has »Nomades de Khor».

Of the Dzang range Ritter says that it runs from west to east »towards the enormously high glacier-group of Nien-tsin-tangla-gangri of the Tibetans». The sole originality of Hodgson is that he has expressed Ritter's description in other words.

[1] L. c. p. 122.
[2] Hoch-Asien, Band III, Berlin 1834, p. 173, 174.
[3] Tableaux historiques de l'Asie, Paris 1826, p. XXX.

The source Ritter has used is, as he says in a note, Klaproth: *Carte de la route de Tching-tou-fou à H'lassa*, 1830, and *Description du Tubet, trad. Père Hyacinth etc. Paris 1831.* The original source is Chinese.

Hodgson himself quotes Ritter as his source. He says that his important range »is indicated by the Nien-tsin-tangla of Ritter's Hoch-Asien and by the Tanla of Huc». According to him those writers use a name in a contracted sense, which he, »following native authority», uses in a wide sense. But which native authority we are not told. Ritter and Huc were not so wrong after all, as Nien-chen-tang-la and Tang-la are two different systems, running parallel with each other. Hodgson combines them to one and the same system. Even in this mistake Hodgson is not original, for Ritter says of the Nien-chen-tang-la that »it forms a remarkable boundary-pillar between H'lassa and the Tengri Nor. Further towards the North-east this enormous mountain-system is stretching, North-west of the town Tsiamdo . . .»[1] This opinion was expressed 13 years before Huc's journey to Lhasa and 20 years before his *Souvenirs* were published, 1853, the same year when Hodgson's article appeared. Ritter has, no doubt, been impressed by Klaproth, for instance in the following passage from KANG HI's order of 1721: »Therefore it is obvious that all the great rivers of China rise from the south-eastern slopes of the great chain of Nomkhoûn oubachi, which separates the hydrographical system of the interior from the exterior one.»[2] We have seen above that Klaproth identifies the Nomkhou-oubashi with d'Anville's M. Temen. But Temen is no doubt identical with Tang-la, a fact which was unknown both to Klaproth and Ritter. Hodgson had read Huc's *Souvenirs* and found it easy without any further proof to call the Tang-la a direct continuation of the Nien-chen-tang-la. The western half of his enormous range was supplied by Ritter and the eastern half by Huc. Of both components, which belong to two different systems separated from each other on the meridian of Lhasa by two degrees, he constructed a monstrosity of a range without ever having been in Tibet. It is superfluous to say how little this range has to do with the complicated system which I have called Transhimalaya. In fact only the real Nien-chen-tang-la, known of old and first, in a very vague manner mentioned in Georgi's book, is in accordance with the truth. But it was Klaproth, Humboldt and Ritter, and not Hodgson, who made it known to Europe.

We now pass on to the next geographical article by Brian Hodgson, interesting and suggestive as everything he has written.[3] It deals with the contents of two papers which in 1843 were given to Hodgson by the Maharaja of Nepal. It comprises official summaries of the routes of two embassies of tribute which Nepal, since the war of 1792, was bound by treaty to send to Peking once every 5

[1] Ritter, op. cit,, Band II, p. 414.
[2] Mémoires relatifs à l'Asie. Par M. J. Klaproth, Paris 1828, Tome III, p. 370.
[3] »Route of two Nepalese Embassies to Pekin with remarks on the water-shed and plateau of Tibet»: Journal Asiatic Society of Bengal, Vol. XXV, 1856, p. 473 et seq.

years. The ambassadors had to follow a special route and were entertained by the Chinese and accompanied by a Chinese guard. They started in June when the Himalayan passes were snow-free and reached Peking next January.

The most important thing in the papers, as Hodgson says, is the enumeration of the mountain ridges or ranges intersecting the road. The two embassies he deals with are the Chountra's in 1817 and the Kaji's in 1822. The morphological sections as given in the Chountra's account are:

		Kos.	Mountain ridges.
1.	Cis-himalayan region (Kathmandu to Bhairav langúr)	50	7
2.	Trans-Himalayan region (Bhairav langúr to 4 kos beyond Chinchi Shan, where the *great* mountains cease)	635	65
3.	Chinchi Shan to Pouchin (where all mountains cease)	212	30
4.	Plains of China (Pouchin to Pekin) . . .	353	2
	Total	1 250	104

The explanations given by Hodgson are, partly, of special interest in connection with the Transhimalaya. I give the following quotations:

»The native name of Tibet is Pót vel Bód. The sanskrit name is Bhót. This is Tibet proper or the country between the Himalaya and the Nyenchhen-thánglá, which latter name means (and the meaning is worth quoting for its significance), pass of (to and from) the plains of the great Nyen or Ovis Ammon, or rather, great Ammon pass of the plains. That portion of Tibet which lies north of the Nyenchhen-thánglá (as far as the Kwanleun)[1] is denominated by the Tibetans — the western half, Hóryeul and the eastern half, Sókyeul, after the Hór and Sók tribes respectively. The great lake Namtso demarks Northern Tibet in the same way that the great lake Yamdotso denotes Southern.»

In this passage we again recognize Klaproth and Ritter. If Hodgson had had an occasion to make any reliable and original observations he would have found that the southern half of the country north of Nien-chen-tang-la (in its widest sense) is inhabited exclusively by Tibetan tribes, most of them nomads, only a few settled; the northern half, the western portion of which is supposed to be called Horyul in Tibet, or the country of the Turks, is in reality uninhabited and has never been inhabited, except the northern slopes and valleys of Kwen-lun, where the Taghliks or Turkish »mountaneers» dwell; the eastern half is inhabited by Tsaidam Mongols and Tanguts. The ordinary word by which the Tibetans denominate northern Tibet is Chang-tang, certainly a very old name, meaning the Northern Plains. The Chinese

[1] Kwen-lun.

had no knowledge of the existence of such a country. On STRAHLENBERG's map it does not exist at all. The unreliable information about it as found in the Chinese texts has been promulgated by Klaproth, accepted by Ritter and Humboldt and, partly, kept its ground until a few years ago. The fact that Hodgson, who lived some 40 years in Nepal and Sikkim and often had intercourse with Tibetan Lamas, has not been able to find out the truth about the countries north of Transhimalaya, but has contented himself with accepting Ritter, — this fact proves how very unknown and how difficult of access this highland has always been.

When Hodgson makes the Nam-tso and Yamdok-tso signify Northern and Southern Tibet resp., he has been influenced by Humboldt, whom he quotes later on in another connection. Humboldt says: »Si l'on veut indiquer simplement les trois plateaux situés entre l'Altaï, le Thian-chan, le Kuen-lun et l'Himâlaya par la position de trois lacs alpins, on peut choisir à cet effet ceux de Balkachi, Lop et Tengri (Terkiri nor de d'Anville); ils correspondent aux plateaux de la Dzoungarie, du Tangout et du Tubet.»[1] At another place he determines the »Tengri noor» as north of »Nien tsin tangla», whereas south of it and west of the peak »Yarla Chamboï» is the lake »Yamrouk youmdzo».[2] Curious enough he lets Lop-nor indicate the plateau of Tangut; the Tengri-nor indicates — not the plateau between Kwen-lun and Nien-chen-tang-la, but that between Kwen-lun and Himalaya. Hodgson has improved this example of geographical homologies by letting Tengri-nor signify northern Tibet. Here he gives us an idea of what he calls *Northern* Tibet. But he cannot help it, for the country was, as the whole Transhimalaya, unknown in his days. Practically nothing else was known than the name Nien-chen-tang-la, and that only from Chinese texts.

Of the mysterious name Langur, famous from the missionaries' time, Hodgson says: »the documents now submitted themselves suffice to prove the meaning of langúr, since they show it to be equivalent to the lá of Tibetan and the shán of Chinese; consequently also to the Turkish tágh and the Mongolic úlá. It may therefore be rendered 'mountain' as well as 'mountain pass', and this is the reason, perhaps, why the Nepalese often do not discriminate between the name of the pass and of the peak of Bhairava but blend them both under the name Bhairav langúr, which is equivalent to the Gnálhám thánglá of the Tibetans. Col. Waugh therefore may be assured that his Mount Everest is far from lacking native names, and, I will add that I should venture in any case of a signal natural object occurring in Nepal to furnish the Colonel with its true native name (nay, several, for the country is very polyglottic) upon his furnishing me with the distance and bearings of that object, although neither I nor any European had gone near it.»[3]

[1] Fragmens Asiatiques, Paris 1831, p. 25. Compare also the German edition of l'Asie Centrale. I, p. 135.

[2] Fragmens Asiatiques, p. 79, 80.

[3] Colonel Waugh wrote as follows about Hodgson's attempt to identify his Dévadhúnga with Mount Everest: »Mr Hodgson endeavoured, in the Journal of the Asiatic Society, to establish the identity

La is pass in Tibetan, *shan* is mountain in Chinese, thus both are not synonymous; *ling* is pass in Chinese and *ri* mountain in Tibetan. But obviously *langur* generally means mountain, although it should be remembered that Hodgson himself gives in Amir's itinerary Langur as the name of a village in this very region, a village which does not seem to have been known to the missionaries.

Hodgson's views regarding Mount Everest gave rise to a long controversy. In 1852 Sir ANDREW WAUGH was informed that this peak had been found to be the highest on the earth and as it had no native name he called it Mount Everest after his former Chief, Sir GEORGE EVEREST. The name Devadhunga, offered by Hodgson, and Gaurisankar by HERMANN VON SCHLAGINTWEIT were not accepted, as subsequent investigation proved that the former did not exist, the latter belonged to another peak. In later years Jomokangkar was said to be the Tibetan name of the peak.

Colonel Sir S. G. BURRARD who gives the above history of the name, arrives at the conclusion that after 50 years of controversy no true native name has been produced for Mount Everest.[1] Major RYDER says: »Nowhere could we hear of any local name for Everest, although careful inquiries were made.»[2] I do not find these assertions convincing. The fact that neither the Tibet Frontier Commission nor any other travellers could find a name does not prove anything, for so far as I know no European has ever approached Mount Everest from the north. I believe that Hodgson is right, for it is extremely unlikely that in a country where every ridge, every pass, every prominent peak has a name, the highest of all mountains should be anonymous. The fact that no name has been found out so far only proves that no sufficiently careful inquiries have been made in the immediate Tibetan neighbourhood of the peak. But even if the real old native name should be found one day in the future, it would be a great mistake to try and introduce it in geography. As Mount Everest the peak will be known for ever.

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of Mount Everest with Deodanga. The arguments adduced for this purpose where so palpably conjectural, resting on hearsay evidence alone, that I thought it needless to refute them, as their fallacious character was apparent to any person competent to understand the subject. The true geographical latitude and longitude of Deodanga are unknown to Mr Hodgson, or even its true bearing and distance from any locality which can be recognised as a fixed point of departure. Its height also is unknown. All these data are elements necessary to the identification of that mountain. The physiognomical contour of a mountain is a very uncertain test, because it changes with every mutation of aspect; but even this test, is wanting in Mr. Hodgson's case, as he has never seen Deodanga . . .

The Sketch Map published by him in the Journal of the Asiatic Society, Dec. 1848, gives his idea of the configuration of that part of the Himalayas; a more erroneous impression of the formation of the country was never formed; he represents a solitary mountain occupying a vast tract . . . this single mountain, however, is entirely imaginary». Proceedings Royal Geographical Society, Vol. I, 1855—56, p. 345. If Hodgson's representation of Himalaya was imaginary, what can be said of his Transhimalaya!

[1] A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet. Calcutta 1907, p. 20.

[2] Geogr. Journal, Vol. XXVI. 1905, p. 370.

It cannot, however, be denied that Hodgson, in this controversy as well as in the morphology of Himalaya in general, has been too rash. Without sufficient knowledge and authoptic experience he makes his constructions at home and believes that he is able in a few words or on a sketch map to solve problems which need centuries to be cleared up. In the same way he has dealt with Transhimalaya, and it is only as an example of his methods in physical geography that I have touched upon his views regarding the questions of Himalaya.

He does not give up his own ground for he says: »Since I presented to the Society in 1849 my paper on the physical geography of the Himalaya a good deal of new information has been published, mixed with the inevitable quantum of speculation, touching the true character of the chain, and the true position of its water-shed, with their inseparable concomitants, the general elevation and surface character of the plateau of Tibet. After an attentive perusal of these interesting speculations I must, however, confess that I retain my priorly expressed opinion that the great points in question are inextricably involved with, and consequently can never be settled independently of the larger question of the true physical features of the whole of the bám-i-dúnya of Asiatics and Asie Centrale of Humboldt.» He goes on saying that it *may be* that the Himalaya is not a chain at all and that ELIE DE BEAUMONT's theory of chains is right even here,[1] it *may be* that Himalaya is not a latitudinal but a meridional chain, it *may be* that the question of the water-shed is to be regarded with reference to the whole eastern half of the continent of Asia . . . and he sums up: »Such things, or some one of them, I repeat, *may be*, and one of the theories just enumerated *may* involve the true solution of questions for some time past investigated and debated on the frontier of India, though without any sufficiently distinct reference to those theories, prior though they all be in date. But the mere statement of them suffices I should say, to show that they will not find their solution on that frontier, but only when the whole bám-i-dúnya has become accessible to science.»

These are wise words. When has a geographical problem of this sort ever been solved in easy chairs at home, and what is the use of disputes beyond the frontier and the loss of time with empty words when only exploration in the unknown country in a simple way lays the unknown regions before everybody's eyes. It would be unjust to Hodgson not to point out that he himself never claimed to have played any part at all in the history of Transhimalaya. He regarded the existence of a range indubitable, for its existence had been made very likely by Klaproth and Ritter. For himself he never claimed an inch of new ground and he would probably not have felt flattered had he known that he would be quoted as an

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[1] Compare: »Nous nous bornerons ici à observer par rapport aux idées ingénieuses que M. Elie de Beaumont a développées récemment sur l'âge relatif et le parallélisme des systèmes de montagnes contemporains, que dans l'intérieur de l'Asie aussi, les quatre grandes chaînes qui courent de l'est à l'ouest sont d'une origine totalement différente de celle des chaînes qui se dirigent du nord au sud, ou du nord 30° ouest, au sud 30° est.» Humboldt, Fragmens Asiatiques, p. 140.

authority in connection with a range, of which he had only read in books and perhaps heard some vague accounts from unreliable natives. He was sufficiently wise to understand that the country north of the Tsangpo could be made »accessible to science» only by exploration, and not by speculation.

Hodgson continues:[1] »In the meanwhile, without seeking to deny that many facts seem to indicate that the axial line of the Himalaya lies beyond the ghát line, it is obvious to remark that this assumed line is still parallel to the ghát line, though beyond it, and consequently *cannot be reconciled* with an essentially meridional axis, such as the Gángri range presents. And, upon the whole, and with reference to organic phænomena especially, the ghát line still presents itself to me as the best divisor of the Indian and trans-Indian regions and climates, though I am not unaware that bráhmanic geography has, from remote times, carried the Indian frontier up to Mansaróvar and Rávanhrád, to the Brahmápútra and Indus line in Tibet. And, again, though I do not, nor ever did doubt that Tibet is a very mountainous country, yet I conceive that there are good reasons for admitting the propriety of Humboldt's general designation for it. He calls it a plateau or elevated plain, and all those I have conversed with who have passed from various parts of the Himalayan countries into those of Tibet, have expressed themselves in terms implying a strong distinction at least between the physiognomy of the former and the latter region. I would add, that nothing can be juster or finer than Turner's original contrast of the two. — No one acquainted, as I have long been, with the native descriptions of Tibet, or with the general and special delineations of the country by Danville, based entirely upon native materials, or with such enumerations of mountain ranges occurring between the Nepalese and Chinese frontiers, as the accompanying documents contain, could for a moment question that mountains abound in Tibet. On the other hand, there are several reasons of a general nature, besides the specific allegations of the fact by the people, to prove that wide spread plains also abound there.»

The most striking statement here is that the Gangri range is said to present a meridional axis. This extraordinary hypothesis could be explained only if Hodgson were speaking of two wholly different ranges: the Nien-chen-tang-la and the Gangri range, as is indeed the case on his map, although even thus it is difficult to understand what he means.

In the above passage we find three new European sources quoted by Hodgson: Humboldt, Turner and d'Anville. He does not say a word beyond what they said long before. Turner describes Bhutan as a very accentuated country, where »there is scarcely a mountain, whose base is not washed by some rapid torrent», whereas Tibet »exhibits only low rocky hills, without any visible vegetation, or extensive arid plains».[2] When Hodgson got Nien-chen-tang-la from Ritter and the

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[1] L. c. p. 481.
[2] An Account of an Embassy etc. p. 216

plateau or elevated plain between Kwen-lun and Himalaya from Humboldt, he had nothing else to do than to say that Tibet is a very mountainous country, abounding in wide spread plains. There is nothing original in this and no order or system either, and how could it be in his time! The native descriptions of Tibet with which he had long been acquainted have not helped him to add any fresh knowledge of the country.

Hodgson has six different proofs of the probability of plains in Tibet. The true ox, deer and antelope types belong to the plains, therefore they live in Tibet and not in Himalaya. There is only one language spoken in Tibet, but many in Himalaya. The Tibetans have *tháng* and *lúng* for plain and valley, »whereas the Himalayan tongues have no word at all for a plain, no distinct one for a valley». But such conclusions are not sufficient for geographical purposes.

All native authorities attest the existence of ranges parallel to and north of the Himalaya, not only in Nári but also in U'tsang and Khám. »The most remarkable of these parallel chains, and that which divides settled from nomadic, and north from south, Tibet, is the Nyénchhén thánglá, of which I spoke in my paper on the Hórsók and of which I am now enabled pretty confidently to assert that the Karakorum is merely the western prolongation, but tending gradually towards the Kwanleum to the westward. But these parallel ranges imply extensive level tracts between them . . . ., whilst the east and west direction of these ranges sustain Humboldt's conception of the direction of all the greater chains of Asie Centrale, or the Himalaya, Kwánleúm, Thián and Altaí, as also of that of the back-bone, of the whole Asiatic continent which he supposes to be a continuation westward of the second of these four chains.»

The new feature in this passage is that Hodgson is now enabled »pretty confidently to assert» the relations between Kara-korum, Nien-chen-tang-la and Kwen-lun. How could he know that Kara-korum was the western prolongation of Nien-chen-tang-la? So late as in 1910 the part of Kara-korum which is situated west of the Tibetan west-frontier was called eastern Kara-korum, instead of western, as if the Kara-korum was supposed to come to an end somewhere near the frontier. To make any assertion whether Kara-korum and Nien-chen-tang-la were a continuous system or not was absolutely impossible in 1856 and is not much easier now. But why does Hodgson not give his sources? The Chinese have nothing concerning this difficult problem. The natives of Tibet could not tell, because they have not the faintest idea of the existence of a Kara-korum and an extremely vague idea of a Transhimalaya. The whole assertion of Hodgson is taken from Humboldt's map, *Chaines de Montagnes et Volcans de l'Asie Centrale*, where, already on the edition of 1831 (Fragmens Asiatiques) the Karakorum Padichah is drawn as a continuation of the Dzang range, only with a short interruption N.E. of Manasarovar. Even the »tending» towards the Kwen-lun is taken from Humboldt's map. In this respect Ritter goes even further for he says of the Kara-korum pass: »Here obviously we

stand on the water-parting of the great Kuenlun System, between the Tibetan Plateau-lands in the south and the Turkestan ones north of it.» [1]

In 1853 Hodgson calls the Nien-chen-tang-la a worthy rival of Kwen-lun and Himalaya. Three years later he accepts Humboldt's great Asiatic systems, Altai, Tian-shan, Kwen-lun and Himalaya, without adding Nien-chen-tang-la. In 1853, having read Huc's book, which in orography is very meagre, he combines Nien-chen-tang-la with Tang-la and three years later in the same easy way with Kara-korum.

In the following passage [2] we recognize d'Anville, Turner, Moorcroft, Klaproth, Ritter, Humboldt and the Stracheys, for there is nothing that they have not told us before, in a more detailed way. »Upon the whole, I conceive, there can be no doubt that Tibet proper, that is Tibet south of the Nyénchhen thánglá range, is, as compared with the Himalaya, a level country. It may be very well defined by saying it comprises the basins of the Indus (cum Satlej) and Brahmaputra. In this limited sense of Tibet Gángri is the water-shed of Tibet. — The region of the lakes, Mapham and Lanag, equal to the Manasaróvar and Rávanhrád of Sanskrit geography, is situated around Gángri, where the elevation of the plateau is 15 250 feet. From this region the fall of the plateau to the points where the rivers (Indus and Brahmaputra, or Singkhá-báb and E'ru) quit the plateau, is great, as we sufficiently know from the productions of Balti and of Khám at and around those points. — Tsáng province is said to be bounded on the south by the Ghúngra ridge; on the west by Mount Ghúndalá; on the north and east by the Kámbalá range; the province of U' to be bounded east by Sángwa gyámda, west by the river Tamchokhamba, south by the Kámbalá range, and north by the Nyénchhén thánglá. Beyond the last named great snowy range is situated the immense lake of Nám tsó which is said to bear the same relation to Northern Tibet that the Yámdo tsó lake does to Southern. The former is the Terkiri and Téngri núr of our maps . . .» To which he adds a note: »Núr is Turkic for lake as tsó is Tibetan. Tengri núr, or celestial lake of the former tongue, is an exact translation of Nám tsó of the latter. The general prevalence of Turkic words in the geography of Northern Tibet more especially sufficiently evinces the presence of that wide spread tribe in Tibet.»

Hodgson knew only one geographical name north of Nien-chen-tangla, namely, Tengri-nor. This he calls »the general prevalence of Turkic words», and concludes on the same ground that »Northern Tibet» is populated by Turki tribes. But *tengri* and *nur* are Mongolian words and cannot prove that the Turkis are present in Northern Tibet. The name Tengri-nor is unknown in Tibet and used only by Mongolian pilgrims. Even such names as Arka-tagh, Piaslik, and Achik-köl, which belong to the Kwen-lun, do not, though really Turki, prove the settled presence of Turki tribes, for they are given by gold-diggers and hunters who occasionally come

[1] Die Erdkunde von Asien, II, Berlin 1833, p. 636. Compare also Humboldt, L'Asie Centrale German Edition, Berlin 1844, Vol. I, p. 100.

[2] Op. cit. p. 483.

to these parts, and are as unknown to the Tibetans as Koko-shili, Buka-magna and Napchitai-ulan-muren, Mongolian names in the north-east. But the Turki tribes, in this easy way introduced in Tibet by Hodgson, were accepted by Saunders, Atkinson and many others.

Brian Hodgson's *Sketch map of the principal natural divisions of the Himalaya* of 1857, Pl. XV, also contains his range north of the Tsangpo, called »the Nyenchhen-thangla Chain». It is drawn as a »worthy rival of the Himalaya» with surprising details quite unknown both to Chinese and European geographers. It is sufficient for us to remember that such a range does not exist in reality. The real Nien-chen-tang-la is a mighty range on the southern side of Tengri-nor, which was known from d'Anville's map and the Ta-ch'ing map. The only difference is that Hodgson, 1857, has altogether deformed and destroyed the almost correct and very conscientious representation on the Chinese maps, of which he at least knew the version of d'Anville. The western continuation is taken from Humboldt's map in *Asie Centrale*, or from Grimm's *Atlas* to Ritter's geography. But instead of Humboldt's very light and conventional way of marking the range Dzang and instead of Grimm's and Klaproth's very serious and scientific work, which was founded on real knowledge and critically sifted, Hodgson has invented a range which neither on the earth nor in the books has any foundation whatever.

In the western part the great range is one degree north of the »Gangri Range» which surrounds »Mapang L.» in the north, east and S.E., without any sort of connection with the Nyenchhen-thánglá. It is this Gangri Range which is called the watershed of Tibet. The legend to Nyenchhen-thánglá: »Separating Southern from Northern Tibet» is, as we have seen, word for word taken from Ritter.

North of Nyenchen-thánglá is »Northern Tibet or Hor Sok Yeul», which already Desideri knew was called Chang-tang. Immediately north of Nyenchen-thánglá is entered the curious legend: »Horyeul or Turk land Horyeul Sokyeul or Mongol land», showing the Turkis as living somewhere between Nganglaring-tso and Transhimalaya and the Mongols between Tengri-nor and Nyenchhen-thánglá, although already Klaproth had placed the Sokyul and Sokpas in the Koko-nor province, where they are still to be found.

The Tsangpo has got the names given by Klaproth: »The Sanpu river Yarutsangpochu or Yáru of Tsang. Eru vel Aru, Yeru vel Yáru, vel Yárutsángpo River.» In this long selection of names we miss the »Tamchokhamba», which in the text is said to be the river which forms the western boundary of the province of U. One almost gets the impression that Hodgson did not know that Tamchok-kamba was one of the names of the Tsangpo.

The northern tributaries of the Tsangpo are drawn with a touching regularity. They gradually increase in dimensions towards the east. Every second one has two distinct branches, those between them only one. They seem to have a mere decorative purpose, and have nothing at all in common with d'Anville's and Klap-

roth's conscientious attempts to draw only such rivers that exist in reality. Compared with Klaproth's map, Pl. III, that of Hodgson looks like a caricature.

»Southern Tibet or Bodpa Yeul» occupies the Tsangpo valley; the name is north of the river. South of the river is Utsang or the Central Province of Tibet, — it is curious that the Central Province can be situated south of Southern Tibet. If Utsang is situated south of the river, it is strange that Tamchok-kamba could be the western boundary of U. And if Nyenchhen-thánglá is the northern boundary of U, one cannot see how Sángwa gyámda can be its eastern boundary, as it is situated east of Nam-tso, which, if Hodgson's map were at all as good as d'Anville's or the Ta-ch'ing map, is a good long way north of Nien-chen-tang-la.

Some of Hodgson's articles were reprinted in a separate volume in 1874.[1] So far as the Nien-chen-tang-la is concerned there is nothing new beyond those passages which have been quoted before. He returns to the question of nomads of Mongol and Turkish race in Northern Tibet and finds witness in »the facts that all its hill ranges are taghs, and all its lakes núrs, both Túrki words».[2] We do not need to enter on this extraordinary view. In a Postscript, p. 27, he quotes Major MADDEN, who, May 1846, in a letter to Hooker wrote of »the disgraceful state of our maps of the Himálaya, which insert ridges where none exist, and omit them where they do exist». Which was said about the Himalaya where many Englishmen had travelled in 1846. Except Bogle, Turner and Manning not *one* had ever touched the Tsangpo-valley. And even these three Englishmen have not a word to say of the Transhimalaya. In how much higher a degree could not Madden's opinion about the Himalaya be applied to the Transhimalaya!

The result at which we arrive is that Hodgson, who promoted science in so many directions, did not add an inch to our knowledge of the Transhimalaya. Sometimes he says that the existence of the range is beyond doubt as he has found from native information, but he never relates what the natives told him. Everything he has to say can, as I have proved, easily be found in Klaproth's, Ritter's and Humboldt's works. His map of 1857 does not even show the state of knowledge regarding the mountain system, — for the year 1857. For the mountains north of the Tsangpo were, although mostly absurd, far better represented 124 years earlier, — on d'Anville's map. On d'Anville's map *some* parts of orography are correct, namely Kentaisse for Kailas, and the ranges Coïran—Tchimouran—Larkin for Nien-chen-tang-la proper and, finally, the fact that he gives us an idea of the existence of several ranges north of the Tsangpo. On Hodgson's map *everything* is wrong, even those parts which were correct 124 years earlier. Neither can we, in this connection, use Lessing's words that he has brought much both true and new, but

[1] Essays on the Languages, Literature, and Religion of Nepál and Tibet: together with further Papers on the Geography, Ethnology, and Commerce of those countries. Part II: On the Physical Geography of the Himalaya. Extracted from the Selections from the Records of the Government of Bengal, No. XXVII. Calcutta 1857. (Reprinted from the Jour. As. Soc. Bengal for 1849.)

[2] L. c. p. 35.

the true is not new and the new is not true, for nothing is true on his map; nor can Ritter's motto be used: Citius emergit veritas ex errore quam ex confusione, for Hodgson was the first Englishman, although by no means the last, to bring confusion into the French and German searching for truth in the geography of these parts and to bring our knowledge a great step in the wrong direction. And where Ritter and Humboldt erroneously preferred one range instead of d'Anville's several ranges, Hodgson followed their example and made the same mistake.

CHAPTER XIV.

THOMSON, HOOKER, CAMPBELL AND CUNNINGHAM.

Among those celebrated Englishmen who in the middle of the last century contributed to our knowledge both of the physical geography and natural history of Himalaya and parts of southern and western Tibet, the three great Doctors, Sir JOSEPH HOOKER, THOMAS THOMSON and A. CAMPBELL occupy the most prominent place. Whilst most of those explorers who, *ex officio*, or on their own account, directed their attention to the mountains of Kashmir, Baltistan and Ladak, were not sufficiently clearsighted to follow up their lines in accordance with or against the views of Humboldt, which in many quarters were accepted as gospel, — these three doctors saw or tried to see far beyond the ultimate horizon of their journeys, and, where they could see nothing, they did not try to construct any systems which, in all probability, would be destroyed some years later. Instead of relating their journeys chronologically I will, in this chapter quote the passages of their works which may serve to illustrate the European approach towards the interior of Tibet so far as my own regions and their neighbourhood are concerned. As these authors sometimes quote each other I take them chronologically only regarding the date of the publication of their works.

In 1848 Dr. A. CAMPBELL published a compilation from some Lamas' reports of an itinerary to Lhasa which gains very much in interest from BRIAN HODGSON's notes.[1] The first four stages took them over Tangla, Tenna, Goroogootang to Dochen (Dochia of Klaproth: Hodgson) with the lake Dochen-tso. Stage 5: Kala Puktang with a lake of the same name, as the former rich in fish. Stage 6: Semodah, Sumdta of Turner and Soumdta of Klaproth (Hodgson). The next six stages are: Kama-chooding, Chaloo, Saloo, Kideepoo, Demorang Zeung and Giangtchi with a river called Changchoo. To which Hodgson gives a note: »Changchoo river of Cháng, softened from Tsáng, which is the name of the western half of the central province of Tibet, called U'tsang, U being the Lassa division, and Tsáng the Digarchi one. The great river of Tibet is called the river of Tsáng, vide Sanpú-Dzangbo of Klaproth. Its pre-eminence leads to all rivers, especially those of Tsáng,

[1] »Itinerary from Phari in Thibet, to Lassa, with appended Routes from Darjeeling to Phari.» Journal Asiatic Society of Bengal, Vol. XVII, Part I, 1848, p. 257 et seq.

being called in a like manner, just as in India any large river is Ganga. Yaru is the distinctive name of the great river whose full title is Yaru-tsáng pochú, great river Yaru of Tsáng.» Professor J. SUMMERS, however, is right in saying that »Tsang po means simply river, and should not be called Sanpu but Tsang po».[1]

The eight next stages are Saoo, Yeung la or Mount Yeung, Rongting River, Dabloong, Karoola, which Hodgson identifies with Klaproth's Kharab, Zhara, Chakloong, and Nagarchi Jong, called Nagardzong on Pemberton's map and Nagar Oze by Klaproth.

Stage 21st is Yamdo, (Yeumtso). Yarbragh Yeumtso of Pemberton's map. Yarbrok Yú and Yambra Yúm of Klaproth. »The lake is of immense circumference»; a man from Lassa once travelled round it in 18 days and he had relays of ponies all the way. Fish are most abundant in all parts of it. The depth of the water is very great. »At one place it is 18 score of fathom, 2 160 feet.» (!) There is an island in the S.W. corner of the lake, on which there is a Goomba named Dorje Phamo. The passage is fordable and about a mile in width. This is the only part of the lake that admits of a fordable passage to the island. In all other parts leather boats are used in the navigation and fishing. The island is a mile in diameter and rises gradually from the water to a height of 200 feet. The island is not at all large, nor is it the least like that in Pemberton's map. Pilgrims circumambulate the island 3 times. There is a spring of fresh water on the island, which supplies the Goomba, and on the mainland the people drink the water of other springs. The water of the lake is not considered wholesome.

Along the lake the itinerary goes to Yassi and Kesong, (Sambo) bridge, crossing a »creek of the Yamdo Yeumtso», which extends in a northerly direction about 2 days' journey. It is not running water. At the bridge it is 400 yards wide. The Yamdo Yeumtso is fed by numerous small rills, but has no river running out of it. The bridge of Kesong is sometimes under water in the rainy season (August). It is formed of 18 stone-masonry pillars with a platform of large slabs or slates. The depth of the water at the bridge in the dry season is but 2 or 3 feet.[2]

Then follows, 24th stage, Phedijong, 25th Tamaloong (Djamáloung of Pemberton's map), and Kambaparzy. The road lies over a pass of the Kambo mountain the whole of which to the north of the road is covered with perpetual snow. The pass is never blocked up. Cambala of Rennell, Gamba of Klaproth. »The Kambola range extends southwards to the Yamdo Yeum lake and a great way to the north.»

Stage 27 is Kumpachangtong and the next Chasumchoori. »At this place you cross the Yaroo Tzangbo, which is the largest river in Tibet. It runs here to the

[1] Essays on Languages etc. Part II, p. 26.

[2] At another place he writes Kesang and says it is situated on the river, Sambo, going to Yamdok-tso from north-west. »Notes on Eastern Tibet». Journal Asiatic Society Bengal, Vol. XXIV, 1855, p. 215 et seq.

eastward, but its course previously is from the north, for it comes southwards along the east side of the Kambo range . . . How can it run in an easterly course all the way from Digarchi when the great Kambo range runs north and south? The Yaroo Tzangbo comes a long way down from the north to the east side of the Kambo range.»

This description is a long step backwards from d'Anville's map. Campbell finds it difficult to compile the routes from the limited knowledge possessed by the informants. As the description went through interpreters confusion arose. REGIS' and d'Anville's results were better, although their information came from natives also.

Hodgson has an interesting note to this: »De Coros (Csoma de Körös), from Tibetan authorities, notices the several great ranges that traverse Tibet. He gives 6 such, and says Lassa and Digarchi lie in a valley between the 3rd and 4th.[1] But he implies that all these ranges run parallel to the Himalaya, whereas the Kambo range is here clearly made to be a transverse or meridional chain, and M. Huc notices no less than 4 such as occurring between Siling and Lassa, viz. Chúgá, Bayam Khár, Tanla and Koiram, the winter passage of all which he describes in fearful terms. The Bayam Khár, says Klaproth, divides Siling from Kham, and the valley of the Hohangho from that of the Yangtse Kiang. The Kambo of this itinerary is the Gamba of Klaproth, who is followed by Ritter in making the range and the river run parallel to each other west to east, with a little northing, all the way from Digarchi to Yamaleing, where the river is crossed and the road strikes north up the Galdze to Lassa. Digarchi is placed on or close to the river by Klaproth (Memoires 3. 416, map) and by Ritter (Atlas of Mahlmann, N:o II Ost Hoch Asien).»

Over the following stages the itinerary goes on to Lhasa: Choosoojung, Chisoom, Parchie, Num, Lang-dong, Jangh, Nithang, Kechoo (Ki-chu), Chambarangjeung, Tcheuling, Teloong, Shemidonka, Debong Gamba and, N:o 42, Lassa.

Campbell fixes the distance at 515 miles; Hodgson thinks it cannot be more than 400 and he makes a close comparison with Klaproth's *Memoires* III, p. 370—417. In his remarks about the ranges Hodgson says: »Dr Campbell's 2nd ridge, is probably the Chún of Klaproth, who however gives it a meridional course parallel to the river Bainam and not crossed by the route. Dr Campbell's Kárú ridge may be the Kharab of Klaproth, and his name, a misprint, for Khárú-lá or mount Khárú. Dr Campbell's Kambo range is questionless the Gamba of Klaproth. The route crosses it according to both. But Klaproth makes it run E and W (from Jagagunggar to Digarchi) only treading a little to the north; and he makes the Sánpú hold a parallel course, excepting the sinuosities of the river. Digarchi is placed by Klaproth on the right and south bank, and the river runs north of the town in an even eastern direction. There is another range, according to Klaproth, north of the river, which is also more or less parallel to its course. The Peaks of this northern range are called Súng Súng, Bukori, Nam, etc. The Kambo or Gamba range does

[1] Compare above p. 72.

not run southwards nor terminate at the great lake, nor can it be the boundary of the U' and Tsáng provinces. A continuation of it, however, running from Jamálúng to the lake is meridional or follows a south direction, and seems to end at the lake, though Klaproth carries it much further south, viz. to Dód, under the name of Ganglagangri. This portion of the range may mark the boundary of the two great provinces. But the route according to Klaproth, leaves it far on the right and crosses it where it has a W and E course parallel to the great river.»

On the Ta-ch'ing map Kambala is entered. D'Anville has the range as a latitudinal ridge crossed by the road but without name. Desideri and Beligatti give a good description of the pass and the road. In GEORGI's *Alphabetum Tibetanum, Rome 1762*, we find, already in the index the following notice: »Kambala. Ex illius vertice Indi & Tibetani viatores religioso ritu salutant nivosos montes.» The situation of Shigatse in relation to the river has been described by Turner. In this connection Hodgson does not give any particulars about Klaproth's range north of and parallel to the river. Judging from Ryder's map the range of Kamba-la is obviously parallel with the course of the Tsangpo, as should be expected. In this paper, published in 1848, Hodgson says the Kamba-la cannot be the boundary of the U' and Tsáng provinces. In 1856 he is of the opposite opinion.[1] A southern continuation of the range he says, in 1848, may be the boundary. As to the watershed Hodgson's opinion is this: »Klaproth makes Chumalári, not Himáchal, the great water shed of this part of Tibet; so also Turner. The snowy range is here, no doubt broken with inner and outer ridges, whereof Chumalári is (for us) the inner and apparently the most elevate, though Cholo is also of vast elevation. From Chumalári the rivers of the route flow south to India and north to the Sánpú.»

Campbell adds a few words regarding the Great Mountain Ranges crossed on the route. The first is Himalaya proper, visible from Darjiling, crossed at »Cholá» eleven stages from Darjiling. The second is the »Yeung range» crossed on the fourteenth march from Phari. The third is the »Karoo range», said to be very lofty and crossed on the third march from Yeung la. The fourth is the »Kamba range», said to be the most lofty in Tibet and crossed on the eighth march from Karoola. It divides the Digarchi and Lassa jurisdictions. »The Kamba range runs southwards, terminating at the great lake of Yamdo Yeum. It is not given in Pemberton's map, but in Mr. Hodgson's route from Nipal to Tazedo, on the Chinese frontier.»[2]

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[1] See above p. 109.

[2] Dr A. Campbell has written another article on »Routes from Darjeeling to Thibet». He says he would not again be a contributor of conjectural information regarding this portion of the Himalaya if anything at all was known to the Society of its geography, »or if circumstances did not preclude the obtaining of precise information by the travels and observations of competent geographers». All his itineraries are compiled from native travellers. There is: 1. a route from Darjeeling to Shigatse; 2. a route from Darjeeling to Yamgatcha; 3. a route *viâ* Lachen and the Latong Pass; 4. a route from Darjeeling to Chumbi; 5. a route from Darjeeling to Shigatse. All these itineraries are now without value, although they may have had some importance at the time they were collected and published.

Let us now pay a visit to the western parts of Himalaya, under the guidance of Dr THOMAS THOMSON,[1] who was a member of the mission, the chief of which was Major A. CUNNINGHAM; Captain HENRY STRACHEY was another member. They left Simla Aug. 2nd 1847,[2] and went up to Kotgarh, Rampur and Chini. Near Kanam they left the Satlej on their right, went up the Piti valley and visited Dankar, where Moorcroft and Trebeck had been before them. They crossed the Parang Pass (18 500) and Parang river south of the Chumoreri lake, where Trebeck had travelled to and from Ladak. Here Strachey left the party in order to cross the great Trans-Satlej chain to the Indus. »The great line of watershed between the Indus and Sutlej lay still before us. This chain, which is the prolongation of Kailas, must be called the Trans-Sutlej Himalaya, unless the name Himalaya be restricted to the chain south of the Sutlej, in which case the mountains of Lahul, Kishtawar, and Kashmir, would loose their claim to that appellation.» The Lanak pass in this range has 18 100 feet. Approaching Hanle Thomson speaks of the »Table Land north of the Himalaya, if any part of Tibet (which I have seen) may be so called.» Concerning the country near Hanley he does not doubt that it was at one time a lake, which has been gradually silted up.

Having touched the Indus valley they again turned S.W. and crossed the range at its left side in Pulokanka La, 16 500 feet. In the Tunglung pass, 17,500 feet, they again arrived at the Indus and reached Leh. Then follows the description of Thomson's clever dash to the Kara-korum-Pass to which we shall have to return in Vol. IV of this work.

Following Humboldt's authority Thomson divides Tibet into two great portions:[3] »One of these, the waters of which collect to join the Sanpu, which in India becomes the Brahmaputra, is still scarcely known; the other, drained principally by the Indus and its tributaries, has been repeatedly visited by European travellers The line of separation between these two portions lies a little to the east of the great lakes (Manasarawar and Rawan Rhad), from the neighbourhood of which the country must gradually slope in both directions towards the sea.»

Stating the fact that the country round the Tsangpo was, in 1852, scarcely known, he involuntarily shows that much was left to be desired even regarding ranges further west and nearer to India, for he says: »the chain which, commencing in Kailas, separates the waters of the Sutlej from those of the Indus, may not improperly be designated the Trans-Sutlej Himalaja.» This range has, of course, nothing whatever to do with the Kailas. The following reflection is more difficult to

[1] Western Himalaya and Tibet; a Narrative of a Journey through the Mountains of Northern India, during the years 1847—8. London 1852.

[2] The heights are given from the Gerards, from his own boiling-point observations and from those of his fellow-travellers. The map is founded on Arrowsmith's large map, Panggong from H. Strachey, the rest from his own rough survey.

[3] Op. cit. p. 457.

understand: »The northern boundary of Tibet is formed by the great chain north of the Indus, to which Humboldt, following Chinese geographers, has given the name of Kouenlun. Our knowledge of the appearance and course of this chain of mountains, by which Tibet is separated from Yarkand and Khotan, is so extremely limited that, except as to its general direction, very little can be said regarding it.» If Kwen-lun should be the great chain north of the Indus one would have to reckon all the mountains belonging to the Kara-korum system, and situated between the Indus and the Kwen-lun, to this last-mentioned system. Thomson, who visited the Kara-korum pass himself, ought not to have accepted any influence from Humboldt who had never seen the country. Here is another example of the danger of blind belief in authority. Ptolemy stopped all geographical progress for more than a thousand years by the authority of his name. And on the other hand Thomson by his own great authority made it still more likely that the Kara-korum belonged to the Kwen-lun. Although Thomson was the first European to reach the Kara-korum pass, he did not bring it in any relation to the Dzang range of Humboldt. A few years later Hodgson, as we have seen, promulgated the continuity as pretty certain, although he had never been in the country. But his assertion was only conjecture built upon maps.

Sir JOSEPH HOOKER's journeys in Sikkim, 1848—50, form an epoch in Himalayan investigation from the point of view of natural history.[1] His exploration brought him up to the north to the Sikkim-Tibet frontier. The peak which he called Forked Donkia and which is on the Tista watershed »is the termination of a magnificent amphitheatre of stupendous snow-clad precipices, continuously upwards of 20 000 feet high, that forms the east flank of the upper La choong. From Donkia top again, the mountains sweep round to the westward, rising into fingered peaks of extraordinary magnificence; and thence — still running west — dip to 18 500 feet, forming the Donkia pass, and rise again as the great mural mass of Kinchinjhow. This girdle of mountains encloses the head waters of the Lachoong, which rises in countless streams from its perpetual snows, glaciers, and small lakes: its north drainage is to the Cholamoo lakes in Tibet; in which is the source of the Lachen, which flows round the north base of Kinchinjhow to Kongra Lama» and belongs to Tista.

Regarding the interior of southern Tibet his experience consists chiefly in distant views. From the Donkia pass, 18 470 feet, he took a splendid panoramic view which is reproduced in his book,[2] and is of interest to us. At his feet to the north he had the lake Cho lamoo, further on a range and, »beyond this range, lay the broad valley of the Arun, and in the extreme northwest distance, to the north of Nepal, were some immense snowy mountains, reduced to mere specks on the horizon. The valley of the Arun was bounded on the north by very precipitous black rocky mountains, sprinkled with snow; beyond these again, from north to

[1] Himalayan Journals etc. London 1854.
[2] Op. cit., Vol. II, p. 124.

north-west, snow-topped range rose over range in clear purple distance. The nearer of these was the Kiang-lah, which forms the axis or water-shed of this meridian; its south drainage being to the Arun river, and its north to the Yaru-Tsampu: it appeared forty to fifty miles off, and of great mean elevation (20 000 feet): the vast snowy mountains that rose beyond it were, I was assured, beyond the Yaru, in the salt lake country . . . The most remarkable features of this landscape were its enormous elevation, and its colours and contrast to the black, rugged, and snowy Himalaya of Sikkim. All the mountains between Donkia pass and the Arun were comparatively gently sloped, and of a yellow red colour, rising and falling in long undulations like dunes, 2 000 to 3 000 feet above the mean level of the Arun valley, and perfectly bare of perpetual snow or glaciers. Rocks everywhere broke out on their flanks, and often along their tops, but the general contour of that immense area was very open and undulating, like the great ranges of Central Asia, described by MM. Huc and Gabet. Beyond this again, the mountains were rugged, often rising into peaks which, from the angles I took here, and subsequently at Bhomtso, cannot be below 24 000 feet, and are probably much higher. — I repeatedly looked from it (the Kinchinjunga) to the high Tibetan mountains in the extreme north-west distance, and was more than ever struck with the apparently immense distance, and consequent altitude of the latter: I put, however, no reliance on such estimates. — I had been led to believe that from Donkia pass the whole country of Tibet sloped away in descending steppes to the Tsampu, and was more or less of a plain . . .» At Donkia he thinks that 19 000 feet »is not below the mean level at which all the snow melts that falls on a fair exposure to the south . . . Forty miles further north (in Tibet) the same line is probably at 20 000 feet; for there much less snow falls, and much more melts in proportion.»

To the N.W. of Donkia he climbed the Bhomtso, 18,500, from where he again had a very commanding view, but on account of the great distance he cannot make out the situation of the different mountains north of the Tsangpo. »For thirty miles north no mountain was above the level of the theodolite, and not a particle of snow was to be seen: beyond that, rugged, purple-flanked and snowy-topped mountains girdled the horizon, appearing no nearer than they did from the Donkia pass, and their angular heights and bearings being almost the same as from that point of view. The nearer of these are said to form the Kiang-lah chain, the furthest I was told by different authorities are in the salt districts north of Jigatzi.»

In these words we hear, as it were, a whispering of greetings from the eastern, still unknown parts of Nien-chen-tang-la, a suspicion of a new world of mountains, »nova quædam series elatiorum, nivosorumque montium ad Boriam», as Georgi says of a more easterly part of the same system. Quoting Georgi Major RENNELL says that from the top of Kamba-la »may be seen towards the north a range of still higher mountains covered with snow».[1] Hooker is so careful and

[1] Memoir of a Map of Hindoostan etc., London 1785, p. 102.

reliable an observer that one gets the impression from his description that there must be a secondary range south of the main range. He calls it the Kiang-lah chain, or Chain of the Wild asses pass, transferring the name of a pass to a whole range, as I have done in some cases further west. So far as I have been able to make out this is all that is known of this problematic range. It may have been touched by Bogle and it has been crossed by the Pundit of 1872, by LITTLEDALE and by Count DE LESDAIN. It cannot be seen from the road near Shigatse, for from the valley of the Tsangpo every possibility of a distant view is excluded, as everything further north is hidden by a labyrinth of high ramifications and steep mountain-shoulders. Only a step further west, on the line from Ngangtse-tso to Ye, am I able to describe the orography and the great lines of the geological building. East of my route and to Khalamba-la the country is absolutely unknown, although Brian Hodgson has entered a range on his map.

Hooker continues his panoramic view:[1] »But the mountains which appeared both the highest and the most distant on the northern landscape, were those I described when at Donkia, as being north of Nepal and beyond the Arun river, and the culminant peak of which bore N 55° W. Both Dr. Campbell and I made repeated estimates of its height and distance by the eye; comparing its size and snow-level with those of the mountains near us; and assuming 4 000 to 5 000 feet as the minimum height of its snowy cap; this would give it an elevation of 23 000 to 25 000 feet. An excellent telescope brought out no features on its flanks not visible to the naked eye, and by the most careful levellings with the theodolite, it was depressed more than 0° 7′ below the horizon of Bhomtso, whence the distance must be about 100 miles.»

With all his conscientiousness, Hooker is not and cannot be able to furnish us with sufficient details to enable us determine where the mountains he saw are really situated. Could it be the Chomo-uchong or any part of the Kanchung-gangri? For later on he says that from Khasia mountains he could clearly see at a distance of 200 and 210 miles and: »I feel sure that I underrated the estimates made at Bhomtso.» But in the case of the mountains just mentioned the distance should be nearly 250 miles and it is probable that the snow-covered summits he saw were situated much nearer his station, especially as he estimates the distance at only »above 100 miles». At any rate Hooker understood that the watershed of the »Yarrow» Tsangpo, was »the lofty range which he saw in the distance».[2]

Hooker continues: »This broad belt of lofty country, north of the snowy Himalaya, is the Dingcham province of Tibet, and runs along the frontier of Sikkim, Bhotan, and Nepal. It gives rise to all the Himalayan rivers, and its mean elevation is probably 15 000 to 15 500 feet: its general appearance, as seen from greater heights, is that of a much less mountainous country than the snowy and wet Hima-

[1] Op. cit., Vol. II, p. 168.
[2] Journal Royal Geographical Society, Vol. 20, 1851, p. 49.

layan regions; this is because its mean elevation is so enormous, that ranges of 20 000 to 22 000 feet appear low and insignificant upon it. The absence of forest and other obstructions to the view, the breadth and flatness of the valleys, and the undulating character of the lower ranges that traverse its surface, give it a comparatively level appearance, and suggest the term 'maidan' or 'plains' to the Tibetan, when comparing his country with the complicated ridges of the deep Sikkim valleys.»

His views of the axis, the watershed, and the line of highest peaks are of interest. The eastern watershed is marked by the heads of the waters flowing north to the Tsangpo and south to the Brahmaputra of Assam and the Ganges and has, as he says, been crossed only by Turner and Bogle, forgetting Manning. He continues: »Eastwards from the sources of the Tsampu, the watershed of the Himalaya seems to follow a very winding course, and to be everywhere to the north of the snowy peaks seen from the plains of India. It is by a line through these snowy peaks that the axis of the Himalaya is represented in all our maps; because they seem from the plains to be situated on an east and west ridge, instead of being placed on subsidiary meridional ridges . . . Though, however, our maps draw the axis through the snowy peaks, they also make the rivers to rise beyond the latter, on the northern slopes as it were, and to flow southwards through gaps in the axis. Such a feature is only reconcilable with the hypothesis of the chain being double . . . Donkia mountain is the culminant point of an immensely elevated mass of mountains, of greater mean height than a similarly extensive area around Kinchenjunga. It comprises Chumulari, and many other mountains much above 20 000 feet, though none equalling Kinchenjunga, Junnoo, and Kubra.» [1]

It is worth noting that the same fate overcame the Transhimalaya, not so long after Nain Sing's journey as after that of the Tibet Frontier Mission. The peaks visible from the Tsangpo valley were believed to belong to one and the same range, which was consequently drawn as an uninterrupted range on Ryder's and Burrard's maps. In the Transhimalaya as in Himalaya the water-parting is situated north of the high peaks. But to join the highest peaks of the southern parts of Transhimalaya and call the result a range would be as if we joined K^2 and the other highest peaks of the Kara-korums with Nanda Devi, Daulagiri, Mount Everest

[1] He gives a general view of the Himalaya in the following words: »These Mountains (the Himalaya) can in the meridian of Sikkim be only defined by the bed of the Yarrow (Tsampo) (say 14 000 feet) on the North, and the plains of India (3 000 feet) on the S. All between is Himalayan mountains. We naturally call the heavily snowed mass the *ridge*, or *axis* of the chain — for that is the visible prominent feature from the S. But it does not follow that the snowy portion indicates the *true axis*, although a few isolated peaks may rise therefrom and top the world; for the snow, being deposited by a southerly wind, only falls on the southernmost elevations, and is prevented from reaching the true axis behind. Were the snow deposited equally on all the Himalaya, we should have the whole land between the parallel of Kinchin-junga and the Yarrow covered with perpetual snow, and then the axis of the chain would clearly show itself far behind Kinchen-junga, and the latter mountain would appear rising from a spur of the same.» Journal Royal Geographical Society, Vol. 20, 1851, p. 49 et seq.

and called this line *one* range. In reality the absolute height has nothing to do with the ranges. Any fold may be an individual range whether high or low, and the height is ordinarily a secondary matter depending on age and denudation.

In a note Hooker adds:[1] »The only true account of the general features of eastern Tibet is to be found in MM. Huc and Gabet's travels. Their description agrees with Dr. Thomson's account of western Tibet, and with my experience of the parts to the north of Sikkim, and the information I everywhere obtained. The so-called plains are the flat floors of the valleys, and the terraces on the margins of the rivers, which all flow between stupendous mountains. The term 'maidan', so often applied to Tibet by the natives, implies, not a plain like that of India, but simply an open, dry, treeless country, in contrast to the densely wooded wet regions of the snowy Himalaya, south of Tibet.»

Regarding the general orography of Tibet Hooker's standpoint is as follows: »Another mass like that of Chumulari and Donkia, is that around the Manasarovar lakes, so ably surveyed by the brothers Captains R. and H. Strachey, which is evidently the centre of the Himalaya. From it the Gogra, Sutlej, Indus, and Yaru rivers all flow to the Indian side of Asia; and from it spring four chains, two of which are better known than the others. These are: — 1. The eastern Himalaya, whose axis runs north of Nepal, Sikkim, and Bhotan, to the bend of the Yaru, the valley of which it divides from the plains of India. 2. The north-west Himalaya, which separates the valley of the Indus from the plains of India. Behind these, and probably parallel to them, lie two other chains. 3. The Kouenlun or Karakorum chain, dividing the Indus from the Yarkund river. 4. The chain north of the Yaru, of which nothing is known. All the waters from the two first of these chains, flow into the Indian Ocean as do those from the south faces of the third and fourth; those from the north side of the Kouenlun, and of the chain north of the Yaru, flow into the great valley of Lake Lhop . . .»

The most striking statement in this system is that Hooker, on the authority of Humboldt and Thomson regards the Kara-korum as a part of Kwen-lun. Concerning the mountains north of the Tsangpo he says that nothing is known. He does not even mention Hodgson's constructions. For although Hodgson's views were published three years later, they must have been prepared beforehand and Hooker was on several occasions in 1848—50 Hodgson's guest. At any rate *Asie Centrale* appeared in 1843. But Hooker was too conscientious to accept anything that was not confirmed by reliable facts and as such he seems not to have accepted the Chinese sources. Therefore he calls Huc's book the only true account of the general features of eastern Tibet. Without any doubt Hooker was well acquainted with the geographical literature of High Asia. His general orography may therefore certainly be regarded as the standpoint of knowledge at his time. When he says that the rivers from the south

[1] Op. cit., II, p. 397.

face of Kwen-lun go to the Indian Ocean, he is correct only under two conditions: that the Kara-korum is regarded as a part of the Kwen-lun and that only the western Kara-korum is considered. But when he says that the rivers from the north side of Kwen-lun and Transhimalaya run to Lop, he shows how utterly unknown the interior of Tibet was in 1850. In this Hooker has been influenced by Thomson, whose orographical systems he finds more probable than those of Humboldt. It is, however, difficult to understand what he really means. For, like Thomson, he regards the Pamir or Bolor as the centre from which the three greatest mountain systems of Asia spring: 1. The one to the north-east stretching all the way to Behring's Strait, 2. The Hindoo Koosh, and 3. »The Muz tagh or Kara-korum, which probably extends due east into China, south of the Hoang-ho, but which is broken up north of Manasarowar into the chains which have been already enumerated.» These chains must be Kwen-lun, Kara-korum and the chain north of the »Yaru». But if now, as he says, the Muz tagh or Kara-korum extends due east into China, how can the rivers from the north side of the Yaru chain (= Transhimalaya) flow into the valley of Lake Lop?

When Hooker sometimes speaks of Kwen-lun or Kara-korum and sometimes of Muz tagh or Kara-korum, he obviously means in both cases the same system, in which are situated the Kara-korum pass and the Mus-tagh pass. It is worth while to remember that he and Thomson regarded the Kara-korum, whether alone or as a part of the Kwen-lun, as stretching through the whole of Tibet into China. This was only a hypothesis, for we have seen that the interior of Tibet was utterly unknown. Still the two learned explorers were more perspicacious than some modern geographers who, 60 years later, used the term Eastern Kara-korum for those parts of the system which are situated far in the west, although they have had at their disposal the materials of PRSHEVALSKIY, BONVALOT, BOWER, DE RHINS, WELLBY, LITTLEDALE, etc, and my own crossings in several directions through Tibet.

Dr CAMPBELL's article: *Notes on Eastern Thibet*,[1] published in 1855, does not clear up the complicated orography. He says himself that the best account of the Trans-Himalayan regions is to be found in Dr Thomson's *Travels*. His own contribution runs as follows: »I shall now endeavour to describe the second grand division or 'Eastern Tibet'. It is by all accounts an exceedingly mountainous country, i. e. it contains immense masses and ranges of the most rugged mountains in the world interspersed with extensive plateaus and deep level-bottomed valleys along the streams and rivers. — The Thibetans I have met with, do not recognize a continuous chain of mountains running parallel to the Himalaya; nor are they acquainted with 'Kounlun' as the name of any mountain range. They are familiar with the Himalaya on one hand and call it 'Kangri' which simply means Snowy region, and they know that the country of the Mongols, or Mongolia lies parallel to it on the other

[1] Journal Asiatic Society of Bengal, Vol. XXIV, 1855, p. 215 et seq.

hand . . .; in popular estimation Eastern Thibet is bounded on the north-west by the Kangtisee range of mountains, and a greatly elevated tract of country extending from the base of this range; on the north by Mongolia; on the east by the Sifan and Sechuen provinces of China, and on the south by the Himalaya, from the point at which it is pierced by the Burampootur on the east, to the meridian of the Manasarowur and Rawan Rud Lakes on the west. The general direction of the Kangtisee range is north and south, and it is said to connect the Himalaya and Mongolia, as by a cross-bar.»

This passage was written some nine years after Hodgson wrote his important paper; *Essays on the Languages etc.*, where the Nyenchhen-thánglá was mentioned in a few words. And still Campbell, who was Hodgson's friend did not even mention it. On the contrary, his experience from inquiries was that the natives did not recognize a continuous chain of mountains north of the Himalaya. That they did not know the Kwen-lun is quite natural, for only the Chinese call the system by that name, and then the system is situated far beyond Tibet, ethnologically speaking. It belongs to a country the Tibetans have never heard of. The statement that Mongolia lies »parallel» to Himalaya is incomprehensible. Such assertions only give new proofs of the great vacuum north of the Tsangpo to the European geographer's mind. Campbell's description of the »Kangtisee range» is a survival from Humboldt and others. That anything like it could be written after Moorcroft's and the Stracheys' journeys is curious. A cross-bar connecting Himalaya and — Mongolia!

Campbell gives a short itinerary of a *Route to the Salt Mines in Thibet.* It goes from Digarchi to Punchooling in 3 marches. At Digarchi (Shigatse) the direction is north-west across the Yaroo, but it is not said that both places are on the same bank of the river. Then follow Amringjong 4 marches north-west, Nakchang 8 marches, Sang-zang Lhoda 6, Sakojong 7, To-then 8 marches, all north-west, Bomet 3 marches north, Lon-kurqun 10, Tarokchan 2, Borghagege 3 and the Salt mines one march, all north; being in all 55 marches »for loaded men»,[1] each about 10 miles. With our present knowledge of the country it is easy to follow this route: Shigatse, Pindsoling, Ngapringkyim-tso, Sangsang, Saka-dsong, Bupmet (?), Tarok-tso and Tabie-tsaka. In Campbell's time it was of course impossible to make out the itinerary. He exaggerates the distance which cannot be more than 400 miles.

Dr Campbell has also written an account of the journey he undertook in September, October and November 1849 in company with Dr Hooker and he took part in the climb up the Bhomtso hill. He has nothing of special interest about the country to the north and modestly says he had little occasion to make personal observation. He speaks of a »very curious map of the country compiled by natives who had travelled as Lamas and Merchants over the greater part of it».

[1] Ought to be: for loaded sheep.

It is a pity he has not reproduced that map which may have been of a certain value.[1]

Can it be said that the three famous Doctors, whose work in the Himalaya belongs to the very best and most conscientious ever undertaken, have contributed in any way to our knowledge of the mountains north of the Tsangpo? No, not in the least. The Transhimalaya lay far beyond their reach. The few passages in their accounts which touch upon the region at all, and which have been quoted above, prove that they had a very vague and hypothetic conception of the country. Hooker gives the situation in a very simple and clear way when he says that the mountains north of the Tsangpo are unknown.[2]

It should be remembered that these able scientists and explorers do not even mention Hodgson's fantastical range. They had no doubt observed that Hodgson in his geographical theories was sometimes rather superficial and that he used to build up far-reaching generalisations from single more or less well-known facts. From the name Tengri-nor he concluded that northern Tibet was inhabited by Turki tribes, although the name is a Mongolian word and the lake situated rather in southern than in northern Tibet. Such methods of scientific research were not sufficient, and the learned Doctors were not willing to accept Hodgson's Nyenchhen-thánglá range either.

Captain and Major SHERWILL travelled in Sikkim and published their experiences in the Journal of the Asiatic Society of Bengal, 1853 and 1862; and Captain CHAMER reached the northern passes in the spring 1870. Still Dr W. T. BLANFORD who accomplished a very important zoological expedition to these parts, is right in saying: »It is a curious fact that since Drs Hooker and Campbell first explored the country in 1848—49, but one European had penetrated to the passes of Donkia

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[1] Diary of a Journey through Sikim to the Frontiers of Thibet. Journal Asiatic Society of Bengal, Vol. XXI, 1852, p. 407 et seq. In an address 1852 Sir R. J. MURCHISON sums up the general results of Hooker and Campbell in the following words: »They satisfied themselves of the same fact, which Captain H. Strachey and others had ascertained in the more central and eastern parts of the chain — viz. that the country of Tibet, to the north of the snowy Himalaya, is no plain nor plateau, but presents for seventy miles a succession of mountains which, though ranging from 19,000 to 20,000 feet in height, with flat narrow valleys between, are wholly uncovered by snow.

He (Hooker) will confirm the statement, first published by Dr. Thomson, and afterwards by Capt. R. Strachey, that the Himalaya mountain ridge of our maps is an imaginary line drawn through certain lofty peaks which, catching all the moisture of Hindostan, retain it in snow and ice; and that these, far from being the real axis, are very distant from it. He will also show, that the central and eastern portions of the chain coincide in their main features with those described by the brothers Strachey to the west of the Lake of Mánasarowar, and that there is no plain (properly so called) of Tibet, though the rivers flow for some distances in broad valleys before they are encased in the mountain gorges through which they escape.» Journal Royal Geographical Society, Vol. 22, 1852, p. CVII.

[2] Already in 1849 Dr Campbell had published a very interesting article on his trip to Sikkim, 1848, accomplished at the same time when Hooker was travelling. It does not throw any light over the country to the north. »Journal of a trip to Sikim, in December 1848.» Journal Asiatic Society of Bengal. Vol. XVIII. Part I. 1849, p. 482.

and Kongra Lama before the visit I am about to describe, although the country has been open to travellers during at least half the intervening period.»[1]

In his famous book on Ladak Sir ALEXANDER CUNNINGHAM has not much to say of our system, and what he says only regards its western part. Of Chang-tang he says that it »comprises the two districts of Chumurti and Garo on the Indus, but its extent to the eastward is unknown».[2]

He regards the Bara-Lacha chain as the continuation of the true Himalaya, and he proposes the following names: Mid-Himalaya and Outer or Sub-Himalaya. Beyond the Himalaya he finds at least 3 distinct ranges which he calls Trans-Himalaya, the Chushal, and the Karakoram or Trans-Tibetan chains. He adds: »These names are by no means intended to supersede any that may now exist, but only as descriptive appellations of extensive mountain-ranges which at present have no general names.»

His Trans-Tibetan range is the same as the Bolor and Kara-korum which further east »probably» merges into the Kwen-lun. At the same time it is the northern boundary of the Tibetans. For this unfortunate view he finds some support in Humboldt's *Cosmos*.

Of the Gangri range he says; »The Kailás, or Gangri range, runs through the midst of western Tibet, along the right bank of the Indus, to the junction of the Shayok. Neither Moorcroft nor Vigne has given any name to this range, though both of them crossed it several times, and in different places. I have ventured to call it the Kailás, or Gangri range, because those names are equally celebrated by the Hindus and Tibetans. Kailás or 'Ice-mountain', is the Indian Olympus, the abode of Siva and the celestials. Gang-ri, or 'Ice-mountain', is called Ri-gyal, or King of Mountains, by the Tibetans, who look upon Ti-se, or the Kailás Peak, as the highest mountain in the world. The Trans-Himálayan range divides the head-waters of the Sutluj from those of the Indus, and extends to the western limits of Rongdo and Astor.»

Cunningham's Trans-Himalaya is a part of Himalaya itself, and therefore the name is *a priori* absurd. One could as well call Berner Oberland the Trans-Alps. The Trans-Alai is not a part of Alai, it is altogether another system. Trans-Tibetan is also a very unfortunate appellation. For Bolor was just disappearing and Kara-korum is a part of Tibet from a physico-geographical point of view. His name Trans-Himalaya seems never to have been popular.

To draw the Kailas or Gangri range all the way to the junction of the Indus and Shayok is of course wrong for its north-western continuation goes north of the Shayok. On the other hand Cunningham is right in saying that nothing whatever is known, 1854, of the eastern continuation of the Kara-korum. He could have said the same of the eastern continuation of the Kailas range, but he has not a word

[1] Journal Asiatic Society Bengal, Vol. XL P. II. 1871, p. 367 et seq.
[2] Ladák, . . . with notices of the surrounding countries. London 1854, p. 40.

to say of it, not even a guess. He is persuaded of its north-western stretching, for he says:[1] »The Kailas or Gangri range runs through the midst of Western Tibet along the right bank of the Indus, from its source to the junction of the Shayok. At this point it is cut both by the Indus and by the Shigar river; beyond which it stretches to the north-west, dividing the two valleys, and is terminated at the junction of the Hunza and Nager rivers. The general direction is from south-east to north-west, and the whole length of the range from the celebrated peak of Kailás to Hunza-Nager is not less than 550 miles. In many of our maps the main stream of the Indus or Singgé-chu, is laid down to the northward of the Kailás mountains, and the Garo river or Higong-chu is degraded to a mere tributary, which falls into the great river at Tashigong. But all my informants agreed in stating that the Garo river was the Singgé-chu or Indus, and that the stream which joined it at Tashigong was not larger than the Hanlé river. The Kailás or Gangri range therefore extends in one unbroken chain from the source of the Indus to the junction of the Shayok.»

Curious enough the *Map of the Punjab, Western Himalaya and adjoining parts of Tibet*, drawn by JOHN WALKER and accompanying Cunningham's book, is, both hydrographically and orographically much more correct than the text. For, on the map it is easy to see that the range between the Indus and the Shayok cannot possibly be a continuation of the Kailas range. The fact that it has the name Kailas or Gangri range even on the map, does not interfere. His Trans-Himalayan range he defines thus: »It branches off from the Gangri mountain to the south of Garo, and extends in one unbroken chain through the districts of Chumurti, Rukshu and Zanskar.»

In spite of a few mistakes, easy to understand at so early a date and with such slender material, Cunningham has brought some order into the N.W. part of the real Transhimalaya.

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[1] Loc. cit. p. 50.

CHAPTER XV.

NAIN SING'S JOURNEY, 1865–66, ALONG THE SOUTHERN FRONT OF TRANSHIMALAYA.

In the following chapters we have to consider the results of the Pundits' journeys in so far as they have enlarged our knowledge of the periferic parts of the Transhimalayan system.[1]

The first and most important journey is the one undertaken by NAIN SING during 1865 and 1866 and described by Captain T. G. MONTGOMERIE.[2] As Nain Sing travelled in the valley of the Tsangpo and Raga-tsangpo along the whole length of the Central Transhimalaya, he had excellent occasion to see as much of the southern front of the system as can be seen at all from the most deep-cut depression between the two mighty systems. DESIDERI and FREYRE had seen the same alpine views to the north, but in Desideri's narrative nothing is said of any mountains, except the Kailas. If Desideri's narrative had been known and published before Nain Sing's journey one would hardly have expected any mountains at all, perhaps only ridges of relatively low hills, but most of the country would have seemed to be a *Gran Diserto*, or a barren plateau-plain. Nain Sing's journey proved beyond doubt that real mountains, sometimes considerable, were situated north of the Tsangpo. This route was selected by Montgomerie because he had been informed by natives that it was »practicable as far as the road itself was concerned». A journey on this road would very likely define the whole course of the Tsangpo. The only point on the river hitherto known was the place where Turner had crossed it. »In fact the route from the Mansa rowar lake to Lhasa was alone a capital field for exploration.»

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[1] A historical review of all the journeys undertaken by Pundits may be found in Markham: A Memoir on the Indian Surveys, chapt. X: »Route Surveys beyond the Frontier of British India by native explorers.» And in Holdich: Tibet the Mysterious, Gr. Sandberg: The Exploration of Tibet etc. I therefore regard it superfluous to follow here the Pundits step by step.

[2] Report of a Route-Survey made by Pundit *—, from Nepal to Lhasa, and thence through the Upper Valley of the Brahmaputra to its Source. Journal Royal Geographical Society, Vol. 38, 1868, p. 129 et seq. And Report on the Trans-Himalayan Explorations, in connection with the Great Trigonometrical Survey of India, during 1865—7. Proceedings Royal Geogr. Society, Vol. XII, 1867—68, p. 146 et seq.

Nain Sing reached Katmandu on March 7th, 1865 and managed, after many difficulties to pass Kirong and proceed to Tradum, September 6th. In the company of a Ladaki merchant he went on to Sarkajong (Saka-dsong), where he arrived on October 8th. Over Ralang he arrived at Shigatse, continued, at the end of December, to Gyangtse, crossed the »lofty Kharola mountains» and arrived at »Nang-ganche-jong». He estimated the circumference of Jamdok-tso at 45 miles and the width at 2 or 3 miles. »The Pundit was told that the lake had no outlet, but as he says its water was perfectly fresh, that is probably a mistake; if so, the Pundit thinks the outlet may be on the eastern side, where the mountains appeared to be not quite so high as those on the other side. The evidence as to the lake encircling a very large island is unanimous. Almost all former maps, whether derived from the Chinese maps made by the Lamas, or from native information collected in Hindustan, agree in giving the island a very large area, as compared with the lake in which it stands. This is, however, a very curious topographical feature, and as no similar case is known to exist elsewhere, it might perhaps be rash to take it for granted until some reliable person has actually made the circuit of the lake. The water was very clear, and said to be very deep.»

Then the party crossed over the »Khambala mountains by a high pass» and reached the great »Nárichú» (Tsangpo) at Khambabarche. Over »Chusul» they reached Lhasa on the 10th of January 1866.

On April 21st Nain Sing left Lhasa and marching back by the great road as before, reached Tradum on 1st of June. Then he passed Maryum-la and Darchen and reached British territory after an absence of 18 months.

In his admirable *résumé* of the results Montgomerie says:[1] »Little idea of the general aspect of the country which the road traversed could be given by the Pundit. From the Mansarowar Lake to Tadúm (140 miles) glaciers seem always to have been visible to the south, but nothing very high was seen to the north; for the next 70 miles the mountains north and south seem to have been lower, but further eastward a very high snowy range was visible to the north, running for 120 miles parallel to the Raka Sangpo River.» A very high peak called Harkiang was seen at the western extremity of this range. Another very high peak also rose between the Raga-tsangpo and the Tsangpo. »From the lofty Khamba-la Pass the Pundit got a capital view. Looking south he could see over the island in the Yamdokcho Lake, and made out a very high range to the south of the lake; the mountains to the east of the lake did not appear to be quite so high. Looking north the Pundit had a clear view over the Brahmaputra, but all the mountains in that direction were, comparatively speaking, low, and in no way remarkable. About Lhasa no very high mountains were seen, and those visible appeared to be all about the same altitude. Hardly any snow was visible from the city, even in winter. . . . The mountains had a very desolate appearance. . . .»

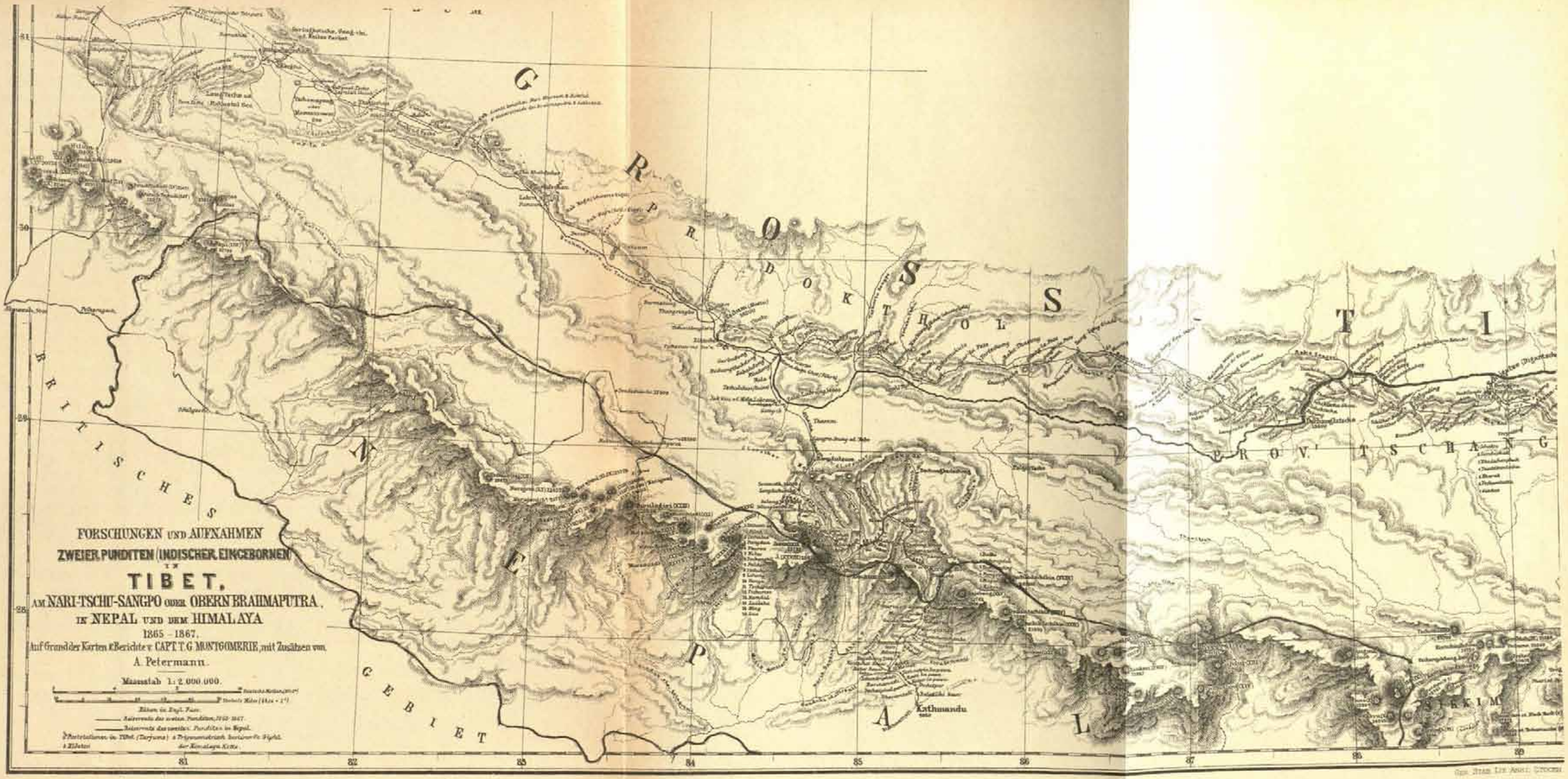
[1] Journal, l. c., p. 150.

Those who have travelled in the Tsangpo valley, — and they are very few, will understand why the Pundit could not tell much of the general aspect of the country from his road. For hundreds of miles we find the valley, sometimes deep and narrow, sometimes broad and open, and there are more or less steep mountain-shoulders on both sides. They will understand that nothing very high could be seen to the north of the road from the Manasarovar to Tradum, although here are even passes crossed by roads, with a height of 5 885 m. (19 303 feet), as Ding-la. For the next 70 miles, or to beyond Saka-dsong the mountains were still lower, although here due north are situated the mighty rocky peaks Lunpo-gangri and Kanchung-gangri, not to mention the Lunkar and Lapchung still farther north. Farther east, and north of Raga-tsangpo, a very high snowy range was visible to the north. I have only seen its western part, the Kanchung-gangri. Curious enough Montgomerie has only entered on the map a small section of its eastern part. So much is at any rate sure that, from Nain Sing's route, absolutely nothing is visible of the principal range of Transhimalaya, the range in which Angden-la, Sha-la and Chang-la-Pod-la are situated. South of this range I have, on my preliminary map, entered two parallel ranges, which are only conjectural. Between my two routes in this region, the country south of Sha-la is still unknown. Discoveries to be made here in future may show that there is only one range, or that the intermediate space is perhaps filled up simply by ramifications from the principal range. From Ryder's map it seems, however, likely that there are really two ranges, the southernmost very near to and parallel with the Raga-tsangpo. On this Ryder and Wood have a peak of 20 000 feet. This, no doubt, belongs to the range mentioned by Nain Sing.

The capital view Nain Sing got from Kamba-la is surprising. If it was a »capital view» and a »clear view» the weather must have been clear. And still to the north he saw only comparatively low mountains in no way remarkable. And this is the very place where della Penna and Beligatti saw »a certain new series of high snowy mountains to the north». The contradiction can be explained only supposing the northern horison was cloudy on the occasion of the Pundit's visit, for otherwise he would have seen the Nien-chen-tang-la.

Montgomerie was an experienced and very clever surveyor in the field. He knew the laws of perspective sufficiently intimately to understand that the Pundit from his road in the valley could not possibly see anything but the nearest mountains. Therefore he concludes: »As a rule, the Pundit's view from the road does not seem to have been very extensive, for although the mountains on either side were comparatively low, they generally hid the distant ranges.»[1] This is indeed the case. At the distance of some 400 miles from Shigatse to Maryum-la, on the map of Nain Sing, only 85 miles are occupied by ranges north of the Tsangpo. A journey in the valleys of the Tsangpo and Raga-tsangpo gives a very unsufficient idea of the mountains to the north. One has to cross them in order to understand

[1] Journal, l. c., p. 151.



The Central Transhimalaya on Petermann's map of Southern Tibet.

them. This is not exceptional, for it is the same with the Kara-korum, Kwen-lun or Himalaya. Even if several peaks and ridges are visible from points situated outside the area of the system, one cannot get the faintest idea of the general building and orography of the system and specially not of such a complicated and irregular system as the Central Transhimalaya.

»The only geological fact elicited is that the low range to the east of the Lhasa River was composed of sandstone. According to the Pundit, this sandstone was very like that of the Siwálik range at the southern foot of the Himalayas.»

From the Pundit's report that the water of the northern tributaries was clear Montgomerie draws the correct conclusion that »none of the northern tributaries appear to rise among glaciers, or, at any rate, if they do, the glaciers must be very remote or very small, as their streams were clear, even in April and May, after the rivers had begun to rise».[1]

I regard Montgomerie's discussion of Nain Sing's comparatively meagre report as one of the best works ever written on Tibet. It is admirable that he has been able to read so much and so well between the lines and that he has constructed in his own mind the great features of the country in such a correct and scientific way. At such an early date nothing more could possibly have been extracted from the original diary. It may be understood, however, that Montgomerie obtained a good deal of verbal information from the Pundit in answer to his inquiries.

It is a striking fact that, except the quotations given above, there is nothing about the Transhimalaya.[2] Montgomerie does not deal with this problem at all. He only remarks »that more bearings to distant peaks would have been a great addition to the Pundit's route-survey». There is nothing about Hodgson's Nyenchhen-thánglá. The name Nien-chen-tang-la is not even mentioned. On the map there is no trace of Hodgson's range. Only indirectly does Montgomerie remove the water-parting a good distance to the north, when speaking of the northern tributaries. Compared with Desideri, Nain Sing has proved that mountains are really situated north of the river the whole way from Kailas to Lhasa, a fact which was already known from the Chinese maps.

After Montgomerie had read his paper on this important journey before the Royal Geographical Society an interesting discussion took place.[3] Sir RODERICK MURCHISON said that Lord CANNING had determined upon an expedition into this region, but it was never carried into effect. »It had been an opprobrium to Englishmen, that though this interesting region lay at no very great distance beyond the Himalaya Mountains, which had been admirably explored by English surveyors, they had never yet reached Tibet» which was a mistake for Moorcroft, the Stracheys and

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[1] L. c., p. 214.

[2] The mountains which Petermann sketched on his excellent map of the Pundits' journeys 1865—67 as situated north of the Tsangpo, are conjectural. Vide Pl. XVI.

[3] Proceedings Royal Geogr. Society, Vol. XII, 1867—68, p. 165 et seq.

Turner had done splendid work in Tibet, and some other travellers had also reached the country. As to the Central Transhimalaya he is still right.

Dr. THOMSON regarded with a feeling almost of envy the success of the Pundit in exploring a region from which Englishmen had, unfortunately, been debarred by the jealousy of the Chinese Government.

Dr. CAMPBELL referred to his and Dr. HOOKER'S panoramic view from the Bhomtso hill and how they could see to the north and west »a very high range of mountains, which he believed had never before been noticed; but their observations on this subject were recorded in Dr. Hooker's journal. The Pundit said that this elevated range ran for 120 miles parallel to his route .... It must be gratifying to Dr. Hooker now to find the Pundit had confirmed his conjectural geography.»

Lord STRANGFORD spoke of the Tibetan table-land being eastward of Lhasa broken up by a succession of rivers and mountain ranges running north and south.

Surprising communications were not missing in the discussion. Sir HENRY RAWLINSON said: »the only considerable part of Asia which was now unknown, and which was unknown not only to the English and to the Russians, but even to the Chinese, was the country intervening in a direct line between Khotan and Lhasa. He hoped that the exploration of that country was reserved for English enterprise, or native enterprise directed by English intelligence. There was also another very interesting problem which must be solved sooner or later, and the sooner the better, namely, the course of the river Brahmaputra. It had been followed down carefully from its source in the Mansarowar Lake to Lhasa; but the part below Lhasa ... was still a mystery.» If the state of geographical knowledge in Central Asia, as set forth by Rawlinson, had been true, PRSHEVALSKIY's career of 15 years' journeys in regions further east and north would have been superfluous, — and this is only one example. But as Sir Henry on the very evening when the supposed source of the Brahmaputra had been given astronomically, could still believe that the river had its origin in Manasarovar, one should not expect too much of his information from parts farther north and east, which had not been mentioned in the lecture.

Finally Mr. T. SAUNDERS stated there was no difficulty in obtaining the consent of the Chinese Government for any European to pass the British frontier into Tibet, and one wonders why nobody took this opportunity instead of sending more or less reliable Pundits.

CHAPTER XVI.

THE EXPLORATION OF THE PUNDITS FROM 1867 TO 1873.

Montgomerie's Pundits of 1867 crossed the western Transhimalaya on their way to the eastern and principal branch of the Indus and to Tok-jalung.[1] They crossed the Mana pass into Tibet, passed Totling and »on the 9th August they crossed the watershed between the Sutlej and the Indus by the Bogola Pass, 19 220 feet above the sea, and reached Gugti Camp, close to Gartok, on the 11th instant, avoiding the latter place, lest its officials should in any way, interfere with their onward progress. Continuing their journey they ascended the mountains east of Gartok, and, after crossing the Gugti-la Pass, 19,500 feet above the sea, they found themselves on the 14th August on a vast desolate plateau, the lowest points of which they ascertained to be 15 280 feet above the sea». The plateau was called Chojothol or Antelope Plain. Gugti-la is obviously identical with Jukti-la. Another pass they crossed is Pabha-la, 17 650 feet. Then follow Giachuruff camp and the Chomorang-la 18 760 feet, and Tok-jalung.

From what the Pundit heard during this expedition and during his journey to Lhasa in 1865 there appeared to be a whole string of gold-fields all the way from Lhasa to Rudok »along the route which must run close to the northern watershed of the Brahmaputra, probably in the depression to the north of it». There is really a road from Lhasa to Tok-jalung in the depression of lakes north of the Transhimalaya, north of the watershed.

Then the Pundit who had proceeded so far returned to Giachuruff where the whole party was re-collected. They followed the Indus down to the junction with the Gartang-chu, thus crossing this part or branch of the Transhimalayan system in the transverse valley.

Of the Aling-gangri which Montgomerie estimates at 23 or 24 000 feet he says: »The Aling-Gangri group had never, as far as I am aware, been heard of before. They appear to be a continuation of the range between the Indus and the Pangkong Lake. The Pundit could see no farther continuation of the range to the east of Thok-Jalung. Another high group was seen to the east of the Medok-la,

[1] Reports of the Trans-Himalayan Explorations during 1867. Journal Royal Geographical Society, Vol. 39, «1869, p. 146 et seq.

on the watershed between the Sutlej and Indus.» It may be regarded as very probable that the range of which the Aling-gangri is the culminating peak, continues to the S.E. through parts of Tibet which have not yet been explored.

»When at Thok-Jalung the Pundit made diligent inquiry as to the adjacent countries; he was informed that a large district, called Majin, extended for nine days' journey to the east, and that a smaller district, called Shellifuk, lay to the south-east. The Majin country was said to be a difficult one to travel in, as no rivers ran through it. The Shellifuk district boasted of some streams, but they all run into a large inland lake.»

The Majin of the Pundit is no doubt my Yumba-matsen, to the southern boundary of which I proceeded in 1907. What he says of Selipuk is also generally correct. The Pundit heard »that at a considerable distance to the north-east there was a tract called the Whor country, inhabited by Shakpo people, the same style of people as those who come from Jilung. Tartary is said to be to the north-east of Whor.» As Jilung is reported to be about one month north of Lhasa it must be Sining. The Skakpo is Sokpo or Mongols of Tsaidam. Whor is Hor or Eastern Turkestan.

»There is said to be a direct route from Thok-Jalung, south-east to Tudam monastery, on the great Gartok and Lhasa road. This route crosses some comparatively low ranges, but is said generally to run over great plains.» Such a road really exists and I obtained some information about it in Selipuk, which will be given later on. It is true that it does not cross any high mountains as it passes between the parallel ranges.

On the map of the Pundit's journey in 1867 we find three more or less parallel ranges all belonging to the Transhimalayan system. One »Snowy Range» is situated between the Gartang-chu and the Lang-chu, the second is on the left bank of the eastern Indus branch and the third along the north and east bank of the source. This range is called Chomorang in the text, and the pass in which it was crossed, Chimorong-la on the map. The route between Gartok and Tok-jalung thus crosses the western Transhimalaya. We shall have to return to it for I have done the western part of the same route.

A few passages from the discussion after this paper may be quoted as throwing some light upon the knowledge of High Asia at the time. Sir HENRY RAWLINSON found it important »to remember that at last we had penetrated beyond the great elevated plateau which bounded India to the north». Regarding the several gold-fields of Western Tibet he said: »We know that the gold-diggers resorted to a place about 100 miles to the south-east of Ilchi, and obtained the gold along this range, so we had fair ground for believing that the gold-fields extended from Lhasa, along the foot of that range, for a distance probably of nearly 1 000 miles in a direction north-west and south-east.» It is not clear which range he is speaking of. It seems to be 100 miles S.E. of Ilchi and it stretches from Lhasa to the north-west for 1 000 miles. Thus it crosses the whole of Tibet from Lhasa to Khotan cutting the eastern

end of Hodgson's Nyenchhen-thánglá chain in some mysterious way. This range existed, of course, only in Sir Henry's imagination, as Nyenchhen-thánglá in Hodgson's, although the latter had at least the authority of Chinese sources.

He concluded: »In giving every possible credit to the Pundits, we must remember that this was not entirely a new country. The portion from Gartok to the north-east was entirely new; but Moorcroft and Henry Strachey had both been up the Indus as far as Gartok. There Strachey heard of the other branch of the Indus now discovered by the Pundits, but he was unable to penetrate into Independent Tibet. He believed, in fact, it was quite impossible for any European traveller to penetrate into that country.»

Sir R. MONTGOMERY said that in 1854 Lord DALHOUSIE tried to make a road from Simla towards Gartok, with the object of opening an overland route to China from India. It was never carried out. Only some 50 years later it was built from Simla to the Tibetan frontier.

In 1868 Montgomerie sent a new Pundit expedition into Western Tibet to explore the country north of Aling-gangri. If possible the exploration was to be carried from Tok-jalung »along the upper road to the Tengri-nor Lake and thence to Lhasa; failing that, to take the route through Majin and Shellifuk towards the Tadum Monastery.»[1] The itinerary goes from Spiti through the upper part of Chumurti and Ladak to Demchok, and thence to Rudok. Then the Pundit went eastwards through the districts of Rawung and Tingche to Dak-korkor. Several small lakes and a large salt lake called Rawung-chaka or Phondok-tso were passed on the way.

On his way from Rudok to Tok-jalung the Pundit saw no high peaks to the north or east, which seemed to prove the existence of a large plain; therefore Changtang. »According to modern maps this plain extends a great way east, nearly up to the end of the Great Wall of China near the city of Sewchoo, to which place the Chief Pundit appears to have got a rough route when in Lhasa.» The further way goes over Chak-chaka and through Majin, a very level country. The drainage sloped to the east, where only comparatively low rounded hills were visible. Passing salt- and borax lakes and travelling S.E. for nine days the party reached a river, Chu-sangpo, so large that it cannot be forded during the summer. »This river flows east-ward and falls into the lake called Nala-Ring-cho, or Cho-sildu, said to be about the same size as the Mansarowar Lake; it has a small island in the centre.» The Pundit heard that one river entered the Lake from the east and another from the north. So far as I touched Nganglaring-tso I saw only the rivers coming from the south and S.W. The Pundit was not permitted to follow the northern route to Tengri-nor, but had to go S.W. to Manasarovar. He followed the Chu-sangpo, also called Sangpo-chu nearly to its source, »crossing one very high range called

[1] Report of the Trans-Himalayan Explorations made during 1868. Proceedings Royal Geogr. Society, Vol. XIV. 1869—70, p. 207.

Nakchail, and another called Riego», which Montgomerie unfortunately regards as off-shoots of the Kailas peak. »The Nakchail peaks appeared to be very high both on the east and west.» The Chu-sangpo is obviously the same as Sumnu Chu of the map: *Tibet and the surrounding regions*, edition 1906. It is identical with Sumdang-tsangpo or Lavar-tsangpo or the lower part of the former and upper part of the latter.

From Manasarovar the Pundit took the great road to Shigatse where he was stopped. »Whilst marching between the Mansarowar and Shigatze he was able to take bearings to various peaks north and south of the road, which no doubt will add considerably to our knowledge of the mountains on either side of that route; but as the Pundit has only just returned, there is no time to give any further account of his route and adventures in the present report.» The results of these bearings seem not to have been satisfactory for, so far as the mountains north of the Tsangpo are concerned, the map in the Journal, Vol. 45, 1875, p. 299, is exactly the same as the one published in connection with Nain Sing's journey of 1865.

Another native explorer contributed to some extent to the knowledge of the Himalayan watershed and of the country north of the great Himalayan peaks.[1]

In the discussion which took place after this paper Sir HENRY RAWLINSON said, »the essential point in the late discoveries by the Pundits was, that they seemed to afford a proof, or, at least, a strong presumption of the truth of the theory that, from Rudok to the northward, there were no mountains. It was originally stated by Moorcroft, and, subsequently, by other Tibetan travellers, that it was notorious in the country that there was in ancient times an Imperial road leading by Rudok outside the mountains to Khotan, in which case there could be no barrier at all. He himself believed that, when once the traveller crossed the Indus, and the inner or northern crest of mountains, he was fairly on the plateau of Tartary, and that the land descended gradually to the Great Desert, so that wheeled carriages might traverse it without crossing over any pass at all.» Therefore he found it infinitely important to carry the trade road to Shipki, after which »trade would soon avail itself of it, as there would then be a good road practicable for wheeled carriages not only across the Himalayas and on to the Tibetan Plateau, but, as he believed, passing by Rudok outside the Kuen-lun and the other great ranges, and conducting fairly into the centre of Central Asia.»

It is difficult to believe that this passage was meant seriously. Carriages on a meridional road through Tibet! From the country beyond the upper Indus not a single pass and no mountains at all! The trade-road should have gone through the countries which Hodgson had populated with Turki tribes and where Rawlinson had Klaproth's, Ritter's and Humboldt's mountains suddenly to disappear. The road should keep »outside of», or east of the Kwen-lun and the other great ranges. Thus

[1] Report on the Trans-Himalayan Explorations . . . Great Trigon. Survey of India, 1868, p. VI.

these ranges should not stretch farther east than to a line drawn between Rudok and Khotan.

Fortunately enough T. SAUNDERS was present to save the authority of the Society: »It appeared to him that a continuous slope, from the Gangdisri Mountains on the south, to the plain of Khotan or Gobi on the north, would be more remarkable than a sudden descent from another range of mountains forming the northern edge of the plateau, and in continuation of the range actually known to skirt the plateau between the Chang Chenmo plains and Khotan . . . He therefore preferred, in the present state of geographical knowledge, to represent the northward edge of the plateau of Tibet as an escarpment descending rapidly to its base, than as a continuous slope.» Sir Henry replied that in the *Tarik-i-Rashidi* »the general mountain system of Central Asia was laid down very much in the way Mr Saunders had described it». Impossible to understand as Saunders believed in the existence of another range of mountains at the northern edge of the plateau! According to his oriental source Sir Henry believed in »but one great mountain system of Central Asia», called Tien-shan, Pamir, Himalaya in different parts of its great bend. »Rudok was regarded as the limit on the northern side of this chain, thereby showing that there could not be a further interior crest.»

It is curious to see how the great men of the time were fighting for and against the highest mountain ranges on the earth's crust. As a rule they only »believed» without telling why they believed in one view or the other. Even d'Anville had a range south of Khotan, although his and Strahlenberg's map could make it likely that Gobi was, farther east, in uninterrupted connection with northern and central Tibet. But why should *Tarik-i-Rashidi* be more reliable than the Chinese sources? Berghaus on his map of Asia, 1843, has a double range between Eastern Turkestan and Tibet, north of the Namur-noor, continuing the whole way to Kansu. And how could the plains seen by a Pundit at the upper reaches of the Indus be sufficient to prove that the whole eastern Kwen-lun did not exist?

Of the Transhimalaya there is nothing in connection with the journey we have dealt with now and nothing in the discussion either.

In 1871 Montgomerie sent another native explorer into Tibet. So far as to Dr. Hooker's Wallangchoon Pass Montgomerie deems it unnecessary to give the details as Hooker had already admirably described this part. The explorer calls it Tipta-la and places it on the boundary between Nepal and Lhasa. He crossed a feeder of the Arun river and reached a fresh-water lake, Chomto Dong (14 700) which had never been shown on any map but heard of by Hodgson and Campbell. North of the lake is the Lagulung La, 16 200 feet, surrounded by glacier ice. On the northern side the Shiabal-Chu was flowing down to the Tsangpo. He reached Shigatse and followed westwards the road south of the Tsangpo to the village of Shimrang crossing the Shabki-Chu, called Shiabat on the map, and flowing to the Tsangpo. Over Shakia-gompa the road goes to Dongo La, the watershed between

Arun and Tsangpo. Thence he followed the Dingri-Chu to the west. From Dingri a very good road runs north-west to Jong-ka-Jong (Songka-dsong), and thence by Kirong to Katmandu. Thung-lung La, between the Arun and Bhotia-Kosi was found to be 18 460 feet high. Montgomerie says the explorer crossed the Himalayan watershed on this pass which cannot be right. »On reference to the map it will be seen that by this exploration the position of the great Himalayan watershed has been determined in three different places. In each case it proves to be far behind or north of the lofty peaks that are visible from Hindustán, such as Mount Everest, Kanchinjinga, etc.»[1] Only on Lagulung La and Dongo La was the great watershed crossed. »The explorer's route survey may be said in a rough way to give us a general idea as to how the mountain drainage runs between the Himalayan watershed, north-west of Kirong, and the point where Turner crossed it near Chumalári, up to the Bráhmáputra, or Sangpo River on the north from west of Jang-lache to Shigatze.»

[1] Journey to Shigatze, in Tibet, and Return by Dingri-Maidan into Nepaul, in 1871, by the Native Explorer N:o 9, Journal Royal Geogr. Society, Vol. 45, 1875, p. 330 et seq.

CHAPTER XVII.

THE EXPLORATION OF TENGRI-NOR IN 1871—72.

In MONTGOMERIE's report on the journey of the Pundit 1871—72 we are told from where the Shang-chu comes. This tributary was known to the Chinese, although its course is very incorrect on the Ta-ch'ing map and on d'Anville's. BOGLE had travelled up the valley as far as to Namling. Montgomerie's Pundit crossed the whole mountain system between Tsangpo and Tengri-nor and was able to follow the river up to what seems to be its very source.

He entered Ngari-khorsum from Kumaon and travelled from Manasarovar to Shigatse where he arrived on November 24th 1871. The report does not contain anything about this route, probably because nothing was added to the observations already made by the earlier native explorers.

On December 7th, 1871, the Pundit crossed the Tsangpo on a raft and camped on the northern bank in a village called Peting.[1] After 4 days he reached Dongdot-lo, a village on the right bank of the Shang-chu (Shiang Chu). Of Namling, which is also on the right bank, he says there is a large monastery, with about 500 Lamas; the monastery is on a high hill, it is a place of some importance, boasting of an iron bridge over the river, and commanded by a strongly situated fort, which is the residence of the Jongpon, or Governor, with about 500 Tibetan soldiers; Namling itself has about 200 houses, surrounded by gardens, with a small bazaar in the centre. On the 27th of December he reached Naikor, beyond which there was no more cultivation; only Dogpá nomads, live in the high region. At Chutang Cháká there were some 15 hot springs of 166° F. So far the valley was called Shiang Lungba, and from here to the north Lahú Lungba. »On the right bank of the Lahú Chu River, there is a large stony place about 120 paces in length, from which about a dozen columns of hot water issue; these rise to a height of forty or fifty feet, and produce so much steam that the sky is quite darkened with it; the noise, moreover, was so great that they could not hear one another speaking; the water of these jets was found to be 176° F. Similar jets of water were noticed issuing from the middle of the river, shooting up to forty or fifty feet in height, and evidently at much the same temperature as those on land, as they produced clouds of steam,

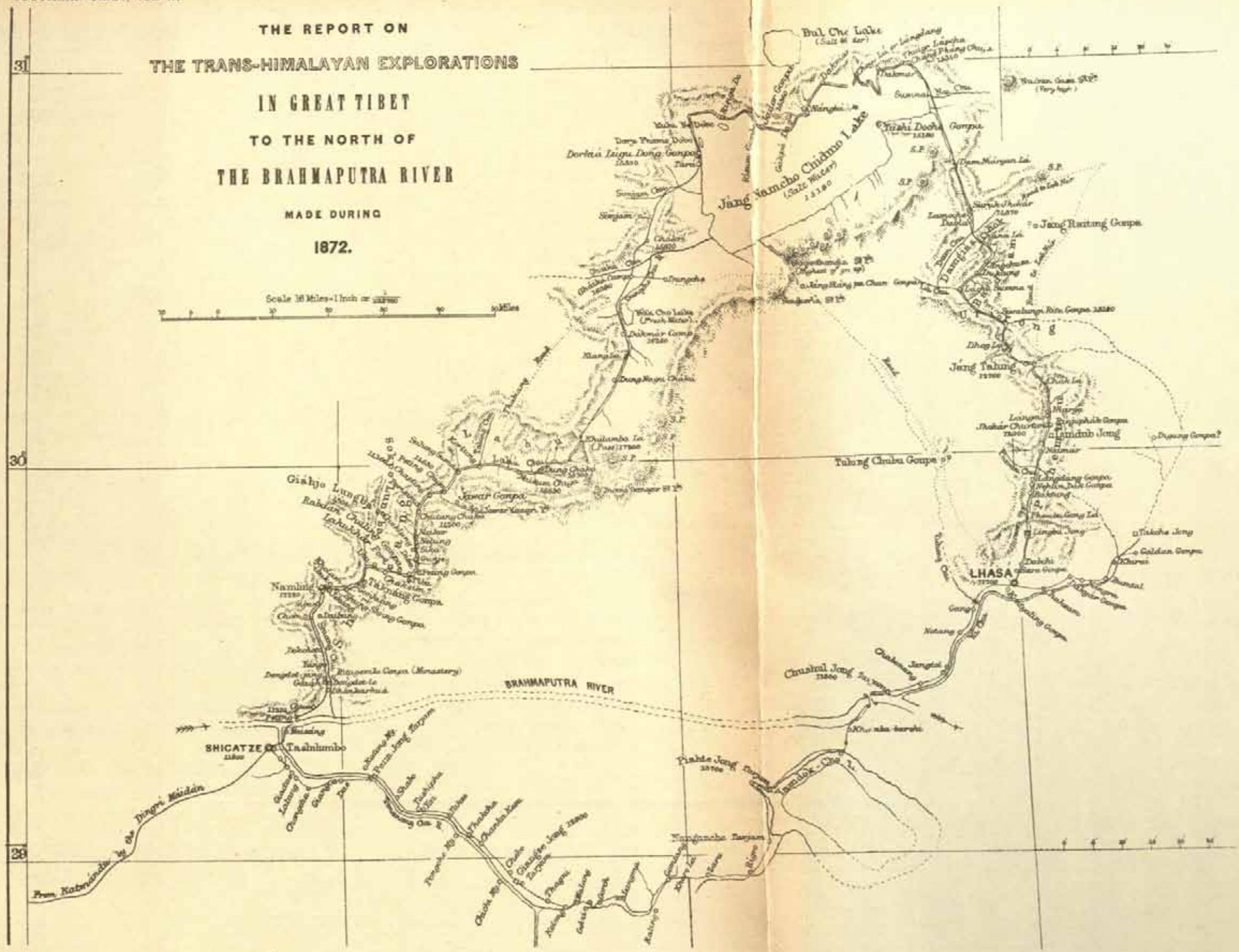
[1] »Narrative of an Exploration of the Namcho, or Tengri Núr Lake, in Great Tibet, made by a Native Explorer, during 1871—72.» Drawn up by Lieut. Colonel T. G. Montgomerie, . . . Journal Royal Geogr. Society. Vol. 45. 1875, p. 315 et seq.

and the river was free from ice for a quarter-of-a-mile below them, though everywhere else, both above and below, it was hard frozen.» Such observations are important, for they point to a lively activity still going on in the Transhimalaya, which has proved to be a comparatively young formation. There is in the report another description of the same kind, but still more surprising. At some places further west in the transverse valleys of the Transhimalaya I have seen hot springs, but nothing like the following: »On the 2nd of January the explorer reached Naisum Chuja. Chuja, or chusa, means source of hot-water springs. The name is given to the place from the great number of hot springs which there are here on both sides of the Lahú Chu River. The water from these springs is so hot that the river is not frozen for about three miles below them, though everywhere else it was frozen over. On the right bank of the river there are two very remarkable hot springs, which throw up a jet of water over sixty feet in height; the water in falling again freezes and forms pillars of ice, which are nearly up to the full height of the jet. These pillars are about thirty feet in circumference, and look like towers, with holes at the sides just as if they had been made artificially. The water is thrown up with great violence and noise. The thermometer, when put in the water inside the pillars, stood at 183° F., the boiling point there being only 183.75°.»[1] The question is only: was it really ice, and not white deposits from the spring water, of the same kind as may be seen in the valley leading up to Chang-lung-yogma in the Kara-korum mountains?[2]

At a third place still higher up there were hot springs with 130° F. On January 8th Khalamba-la was crossed at 17 200 feet. At Dung Nagu Cháká on the northern side hot springs of 180° F. were found. From Gháiká he could see a big lake, which was found to be Jáng Namcho Chidmo or Tengri-nor. A river, Gháiká Chu, said to be swollen in summer, comes from the west. On January 21st he arrived at Tengri-nor which he found completely frozen. Dorkiá Lúgú Dong is a monastery on the western shore. Ringa Do is a place on the northern shore, near which is an island. Then follows Jádor Gonpa. On the eastern shore he crossed Nai Chu, a river coming from the east. The next monastery is Tashi Doche Gonpa. Near Jádor Gonpa on the western half of the northern shore »there are a great many fossil stones which are held in veneration; they are called 'Naidhowa'. The explorer saw a gigantic doorway cut in a rock through which the Lámas say the god Ninjinthanglá passes; its height is about 25 feet . . . To the south-west of the Tashi Doche Gonpa there are a number of magnificent snowy peaks which are called the Ninjinthanglá peaks. The Lámas say the highest peak is a god, and that he is surrounded by 360 smaller snowy peaks which act as his servants. To the east of Tashi Doche there is another mass of high peaks called Nuchin Gásá, which appeared to the explorer to rise higher above the Namcho Lake than the Kailás

[1] A similar formation of ice I have described from Mus-kol on the Pamirs, 1894. »Through Asia», London 1898. Vol. I, p. 169.

[2] Trans-Himalaya, Vol. I, p. 82.



Nain Sing's journey to Tengri-nor in 1871—72 (Great Trigonometrical Survey, Dehra Dun, 1875).

Gen. Stab. Lit. Anst. Stockh.

peak does above the Mánsarowar Lake. The whole of these peaks were very imposing as seen from the monastery, which also commands a full view of the whole of the lake.»

Now, for the first time, a reliable explorer saw the famous mountain from the north (Pl. XVII). It had been seen by Europeans before, but only from the southern side. But it was known to exist and the whole range on the southern shore of the lake had been entered, for instance, on the map of Asia in *Stieler's Hand-Atlas* for 1826 (Pl. X). Even the name was known and 40 years before the native explorer's journey Ritter had called the »Nien-tsin-tangla-gangri» an extraordinarily high glacier group, forming a remarkable boundary pillar between Lhasa and Tengri-nor. Montgomerie's explorer talks of the magnificent snowy peaks of Ninjinthanglá. The explorer did not, from descriptive point of view, add much to what was known before. The important addition is that he fixed the situation of the group.

The high peaks of Nuchin Gásá are probably identical with the Mts Samtan gangtsa of the Ta-ch'ing map or a part of them. On the same Chinese map the peaks of Nian tsian tang ra are also entered, although too far to the east.

The explorer also did a good service in giving us a reliable map of the lake, which had so long been represented on European maps with the outlines as on Chinese maps. He characterizes it with the following words: »Though the water of the lake is so salt as to be unfit for drinking, it is nevertheless quite frozen over in November, the lake being about 15 200 feet above the sea; when the explorer saw it the surface looked as if it was made of glass; it is said to remain in that state till May, when the ice breaks up with great noise. The lake contains fish, and quantities of small shells are found on the banks. The lake itself is a great resort for pilgrims.»

He returned along the southern shore, February 7th, to the Dorkia monastery and had now made the circuit of the lake in 15 days. Then he went eastwards again along the northern shore. At Nangba Do he heard of a lake called Bul Cho (Pul-tso), which was visible from a peak he climbed. At Cháng Pháng Chujá near the north-eastern corner of the lake, the hot springs had a temperature of 130°.

Having followed the north and east shores a second time, the explorer turned south, and crossed, on February 23rd the Dam Niárgan Lá, a name that also belongs to the district south of the pass. The explorer heard of a road from Dam Niárgan to Lob Núr and to Jilling or Sinning. It is 10 days to Nákchukhá, thence 45 days to Sokpohuil (Sokpoyul). Montgomerie correctly believes that Lob Núr is mistaken for Koko Núr. Fifteen days more take the traveller to Sining-fu.

The farther way goes south to Cháná Lá. Láchu Sumna is obviously a place where three valleys meet. Dhog Lá is situated between two tributaries, and so is Chak Lá and Phembu Gong Lá. All these secondary passes are situated between western, or right, tributaries to the Ki-chu, an arrangement which is very like the orography further west, where the road from Sela-la crosses the southern ramifications

of the Transhimalaya. According to Dutreuil de Rhins the Pundit of 1871—72 returned from Tengri-nor to Lhasa by the same route as Huc and Gabet, viz. Djang Talong, Loundjoub, and Lingbou.[1]

In his *Memorandum on the Results of the above Exploration*[2] Montgomerie makes some interesting reflections. He begins: »I have always borne in mind the necessity to explore the vast regions which lie to the north of the Himalayan Range, from E. long. 83° to E. long. 93°, and I have consequently, from time to time, tried to get more information as to this *terra incognita;* but since the Pundit made his way from Kumaon to Lhásá, I had not till lately succeeded in getting much advance made to the north of his line of explorations, though a good deal was done to the north of the Mánsarowar Lake. One explorer made his way from Rudok, on the Pangkong Lake, to Thok-Jalung, and thence back to the Mánsarowar, passing quite to the east of the great Kailás peak. The same explorer subsequently made his way to Shigatze, but he was unable to penetrate the north of the main course of the upper Brahmaputra.»

The two lines on which Montgomerie was successful, the upper Lavar-tsangpo in the west and the Khalamba-la in the east are separated from each other by some 460 miles *terra incognita*, as he was justified in calling it in 1875. We find from the above quotation that although Montgomerie hardly ever spoke of any more or less hypothetical range north of the Tsangpo, he was still thinking of this country, which perhaps could as well be a high plateauland as one or several ranges. But he avoided speaking at all of things which he did not know and simply kept the signification of *terra incognita*, which in 1906 could still be read in translation on the English maps of these parts of Tibet. For even so late as in 1906 the space had not been crossed, and these 460 miles are certainly the longest uninterrupted strip of land in the interior of Asia which so late had not yet been interrupted by a single itinerary.[3] Two itineraries, Nain Sing in the north and Rawling-Ryder in the south still remained to be carried out. But none of them entered an inch upon real Transhimalaya. Only a number of peaks could be seen from a distance. The work was peripheric, and the term *terra incognita* had to remain for another 32 years.

Montgomerie further tells us that he could not extract any more details from the explorer's report.

He pays special attention to the numerous hot springs with water of sulphurous smell, in some cases thrown up to 40 or 60 feet, and says they remind one of the Geysers of Iceland. He could have added that they indicate an activity of mountain-building forces still going on.

The Tengri-nor was found to have no outlet and it has never been represented as having one, not even on the old Chinese maps. »The water is decidedly bitter.»

[1] L'Asie Centrale, Paris 1889, p. 486.

[2] L. c. p. 325.

[3] The distance between my two crossings through the Takla-makan desert, along the Keriya-darya in 1896 and between Yangi-köl and Tatran in 1899, is only 180 miles.

Of the Nien-chen-tang-la he says: »To the south the lake is bounded by a splendid range of snowy peaks, flanked with large glaciers, culminating in the magnificent peak, Jáng Ninjinthanglá, which is probably more than 25 000 feet above the sea. The range was traced for nearly 150 miles, running in a north-easterly direction. To the north of the lake the mountains were not, comparatively speaking, high, nor were there any high peaks visible farther north, as far as the explorer could see . . . He only saw a succession of rounded hills . . .»[1]

Some fossil shells found by the explorer were examined by Mr OLDHAM who thought they could not be older than cretaceous.

»The proof of the existence of a great snowy range to the north of the Brahmaputra is interesting, the Himalayan system, even at that distance, say 160 miles from its base in the plains of India, showing no signs of getting lower.» Here at last Montgomerie touches, although only in a few words, upon this problem, which was, as compared with all the rest, the most important and grand to be solved on the other side of the Himalaya. It had been proved by the explorer, if anybody doubted the unanimous statement of the Chinese surveyors, that a great snowy range really existed north of the Tsangpo, — between the meridians of Shigatse and Lhasa, a range, that was identical with the Chinese Nien-chen-tang-la.

The extremely conscientious careful and thorough scientific methods of Montgomerie are even more clearly visible in the sentence quoted than usual. The fact that d'Anville already had this range on his map and that Georgi in 1762 had spoken of a *nova series elatiorum nivosorumque montium*, and that Klaproth, Ritter and Humboldt had written about the Nien-chen-tang-la, was not sufficient for him. He wanted proofs before he laid out such a range on his map. Kailas had been known for hundreds of years in India, described in Chinese texts, translated into French, and seen and fixed by Moorcroft and the Stracheys. Nain Sing had seen two sections of the ranges north of the Tsangpo, halfway between Manasarovar and Lhasa. Montgomerie's own explorers had crossed high passes north of Manasarovar and south of Tengri-nor, and still I cannot find any place in Montgomerie's writings

[1] In an article: »Travels in Great Tibet, and Trade between Tibet and Bengal.» (Journal Royal Geogr. Society, Vol. 45, 1875, p. 299.) Markham says »the explorer advanced north from Namling with the intention of crossing the range, called by Hodgson the Ninjin-thanglá», and speaking of Tengri-nor he says: »To the south it is bounded by the Ninjin-thanglá Range, consisting of snowy peaks flanked by large glaciers, and culminating in the magnificent peak of Jáng Ninjin-thanglá, which is probably more than 25 000 feet above the level of the sea. The range was traced for more than 150 miles, running in a north-easterly direction.» In Montgomerie's report the range was traced for *nearly* 150 miles, in Markham's article for *more than* 150 miles. On the map the distance between the Nuchin Gása Snowy Peak and Khálamba Lá is only 95 miles, but continuing the range to the Shang-chu one gets 130 miles. From the same map one gets the impression that the Nien-chen-tang-la continues straight south-west, along the eastern or left bank of the Shang-chu to the very Tsangpo. Thus it should be 165 miles in length, without counting its north-eastern and eastern continuation to and along the southern or right bank of the upper Salwen. How far it is true or not that the range should stretch to the Tsangpo and run south-west to north-east the whole way, cannot be told at present, as Comte de Lesdain has not contributed to the solution of the problem.

where he has discussed the probability of a continuous range north of the Tsangpo. He never mentions Hodgson's Nyenchhen-thánglá Chain, which he probably despised in comparison with the serious field work he had himself started. He does not defend a Kailas, Gangri or Gangdisri range. Such speculations he leaves, without jealousy, to the arm-chair geographers. For his own account he only accepts and thoroughly digests real authoptic work in the country itself. For, if Hodgson in 1856 could state beyond doubt that the eastern continuation of the Kara-korum was identical with his Nyenchhen-thánglá, and *Stieler's Hand-Atlas*, in 1861 could represent the eastern continuation of the Kara-korum under the name Chor Kette (Hor Range) far to the north, how could one know which of these views was correct? And could not possibly the Gangri range and the Nyenchhen-thánglá be two quite different systems, more or less parallel with each other? Until new proofs were brought forward Montgomerie certainly thought the wisest thing would be to leave the orographic mysteries alone.

The explorer could furnish Montgomerie with some additional information about the northern road or »Janglam», »which runs far north of the course of the Upper Brahmaputra River passes by the Namcho or Tengri Núr Lake, and from thence by Shellifuk Lake to Rudok». Thus both in the west and the east this road was heard of, although nobody knew how and where it went. As I crossed it several times I am able, in a later chapter, to give some more detailed notes about it.

Montgomerie says that the route over Dam Niárgan to Lhásá must be the same which was taken by Huc and Gabet. This is very unlikely as the missionaries certainly followed a more easterly road.

In his *résumé* of the very good service done by the explorer, Montgomerie once more returns to our mountain system saying: »The explorer was much struck with the magnificent glaciers to the south of the Namcho, or Tengri Núr Lake, and they will no doubt prove to be very extensive, as the man is a good judge of their size, being well acquainted with Himalayan glaciers near India.»

In his article: *Great Tibet. Discovery of Lake Tengri-nor*, Sir CLEMENTS MARKHAM gives another *résumé* of the same journey we have just discussed. In this article he says that the semi-Tibetan explorer has »discovered and marched completely round the Tengri-nor, which has hitherto been placed on our maps merely on the authority of old Chinese surveys of unknown authorship». Only when such lakes, rivers or mountains as are impossible to identify from d'Anville's map are visited by modern travellers can one speak of discoveries. But regarding the particular lake Tengri-nor, it is marked beyond doubt and at its approximately correct place on d'Anville's map under the name of Terkiri Lac, a slip of the pen for Tengiri, Tengri. But it is no exaggeration to say: »This is one of the most important geographical discoveries that has been made for many years.»[1]

[1] The Geographical Magazine, Vol. II, 1875, p. 42.

CHAPTER XVIII.

NAIN SING'S JOURNEY IN 1873—74, — AND OTHER EXPLORATIONS.

The next journey of a native explorer is the most important of all as it takes us through a country about which even the Chinese maps and texts kept silent. The best and most famous of Pundits, Nain Sing was selected by Captain (now Sir HENRY) TROTTER. In the following I will quote some important passages from Trotter's brilliant report on Nain Sing's journey.[1]

The Pundit left Leh on July 15th, 1873, and went over Tánksé, Chágra and Marsimik-Lá (18 420 feet) to Niágzu Rawang where he crossed the frontier of Tibet. He followed the northern shore of Panggong-tso and reached Noh, and he was the first to determine the eastern extension of this lake. He says the ordinary name of the lake is Chomo Gna Laring Cho or the »Female narrow very long lake.»[2] From Noh starts the road to Khotan *viâ* Polu and Keriya. By the settled population farther south the nomads in these regions were called *Changpas* or North-men.

Of the Tibetan plateau it is said that it extends eastward »as far as the head-waters of the great rivers which water China, — in fact for a distance of more than 800 miles to the Bourhan Búda Mountains, where we still find a table-land (Huc, Prshevalskiy) rising from 14 000 to 15 000 feet above the sea-level, above which tower gigantic snow-covered mountains». At present we know that the country cannot be called a plateau in the ordinary sense of the word, for in reality it is a country of open, broad valleys with mountain ranges between.

The Pundit's road continues E.S.E. in a wide, open, grassy valley, 6 to 10 miles broad, bounded by low grass-covered hills. Eight days east of Noh he came to a fresh lake, Tháchap-tso; the banks of a stream entering it from north-east, were covered with dense forest of willow, tamarisk and other shrub. The open valley was called »sang». A little to the south of Nain Sing's first 10 days' march from Noh is the route of the Pundit who travelled from Rudok to Tok-jalung. East of Noh he

[1] »Account of the Pundit's Journey in Great Tibet from Leh in Ladákh to Lhása, and of his Return to India viâ Assam». Journal Royal Geogr. Society, Vol. 47, 1877, p. 86 et seq.

[2] I never heard this name in 1901. It should be compared with Nganglaring-tso. The name I heard was Tso-ngombo or the »Blue Lake».

passed several salt marshes, such as Khai Cháká and Dakdong Cháká, where salt is broken and sold to Ladak. Chabuk was a village at 14 400, where many nomads lived in the neighbourhood. The first 30 days led over heights of 13 700 to 15 000 feet; farther on, to Nam-tso, the country became somewhat higher. From Chabuk ten marches to Hissik Chaka the country was uninhabited. To the S.W. is the district of Gargethol. On the map the whole region about there is called Shankhor, a name, as I found, known almost all over Tibet. Gegha is a place in Gargethol; farther east the country consists of level, uninhabited plains.[1]

Beyond Mango and Kezing and to Thok Daurákpa the whole country was uninhabited (at the beginning of September), but said to be visited by Garché-Khámpas at certain seasons of the year. There is capital grazing, fuel and water. »The road lies the whole way in one of the broad open sangs . . . lying between ranges of hills running east and west. South of the Tashi Bhup Cho, the southern range runs off in a south-east direction, rising rapidly in height and forming a massive group of snow-covered peaks, known as the Shyalchi Káng Jáng, the positions of several of which were fixed by the Pundit, although at a distance of from 30 to 40 miles south of the road.»

»From this snowy group flows north-wards a very considerable stream, the Shyal-chu» very swollen during the high-water period. The following passage is curious: »This stream flows into the Tashi Bhup Lake, whose south shore is about 2 miles to the north of the Pundit's road. From the eastern end of the lake a stream issues, whose waters are said ultimately to drain into the Chargut Lake, from which they emerge under the name of the Nák-chu-khá River, and flow eastward to the village of the same name, which lies on the northern road between Lhása and Pekin. At the point where the Shyal-chu was passed by the Pundit, his road was crossed by another track going from Manasarovar to Nák-chu-khá, which passes south of the Tashi Bhup Lake, and then follows throughout its course the stream which emerges from the east end of the lake and flows to the Chargut Lake and Nák-chu-khá.»

Captain Trotter had hardly anything else to do than to accept Nain Sing's assertion and try to make the best he could of his conjectural hydrography which also was accepted on most European maps and kept its ground for nearly 20 years. For instance map N:o 60 in *Stieler's Hand-Atlas* for 1891 has accepted the river flowing from Tashi-bup-tso to Chargut-tso, where, however, it comes to an end, probably as its eastern continuation did not agree with the discoveries made by BONVALOT and Prince HENRY OF ORLÉANS in 1889—90. But even from Nain Sing's own report, where it is said that the country he covered on his way

[1] DUTREUIL DE RHINS is right in supposing that Nain Sing's hydrographical system from Gangethol to the east was unreliable; he prefers to believe in the existence of a series of independent lake basins »les directions des contreforts septentrionaux de la chaîne Tarkou ou Targot confirmant cette appréciation». L'Asie Centrale, Paris 1889, p. 581.

to Nam-tso was somewhat higher than the first 30 days, it would seem to indicate the improbability of a general fall of the ground to the east, a short distance further north.

The very high snowy peak Shyalchí Káng Jáng which he saw to the S.E. is obviously identical with Shakangsham seen by Littledale from the north and by myself from all quarters of the compass.

At Shyal-chu the Pundit crossed the road to Manasarovar. It is not correct to say that it passes through easy but quite uninhabited country throughout for there are several tent villages on this road and even a *gompa*, Selipuk.

At Tok-daurakpa he visited the gold mines where, and at several places all around, the gold is collected from small pits. The diggers pay a certain tax to the *Sarpun* or Gold Commissioner of Lhasa. Tok-daurakpa and Tok-jalung are under the same *Sarpun*, »who makes the round of all Tibetan gold-fields once a year to collect the taxes». When I passed only a few days west of Nain Sing's Tok-daurakpa, which, from his report, seems to be a rather important place, I made inquiries amongst the few shepherds I met, but nobody could tell anything of the place. The same was the case when I passed east of it. This may depend on the fear of the people to give strangers any information about the gold-mines. Nain Sing's experiences about the *Sarpun* agree perfectly with my own.

Nain Sing's representation of the mountain ranges south of Tong-tso and Tashi-bup-tso and his river courses is wrong in many respects, which is not surprising, as he saw the country only from a distance and from the deepest part of the whole region. He has a district, De Chekchu, south-west of Shakangsham, which may perhaps be identical with my Chokchu.

From Tashi-bup-tso he continues to the S.E.; all rivers he crossed go to the north-east, as he believes to the Chargut-tso. The country is easy as before. He is here in the district of Nákchang Pontod Chángmá, south of which is Nákchang Pontod Lhoma. Here he crossed the Bogtsang-tsangpo, which he calls the Bogchang stream and regards as an affluent to another river (Chuzán), which is not correct. In the latter half of September he found the river 20 paces wide and 1 foot deep. He makes the Bogtsang-tsangpo go to the Chargut-tso, but in reality the river has its own recipient, the Dagtse-tso. Some names given by the Pundit round the river I have found to be perfectly correct.

The following passage is of special interest as Nain Sing here mentions some of the ranges belonging to the Transhimalaya, although they are situated north of the principal or water-parting ranges. Trotter puts the observations Nain Sing here made from a distance of 60 miles and more, in the following words:[1] »In the 8th march from Thok Daurákpa the Pundit encountered a lofty range of mountains which was crossed by a high but easy pass called Kilong, 18 170 feet above sea-

[1] L. c. p. 105 and 128.

level. This range runs southward and culminates in some enormous peaks known by the name of Tárgot Lhá, from which extends eastward a snowy range, numerous peaks in which were fixed by the Pundit, along a length of 180 miles up to where the range terminates in a mass of peaks called Gyákharma, which also lie to the south of and very near the Pundit's road. The highest of these Gyákharma peaks was ascertained by measurement to be 22 800[1] feet above sea-level, and the Pundit estimates that the highest of the Tárgot peaks is at least 2 500 feet higher than the highest of the Gyákharma group. Tárgot Lhá was seen from the Chapta Pass at a distance of over one hundred miles, and is believed by the Pundit to be the highest mountain seen by him on his journey. — This range is probably not the watershed between the basin of the Brahmaputra and the lake country of Hor, for the Pundit was informed that to the south of the range, running parallel to it, is a large river, the Dumphu, or Hota Sangpo, which ultimately changes its course and flows north-wards into the Kyáring Lake.»

This section of Nain Sing's journey is, so far as I can see, the most important of all discoveries he made during his long and brilliant work in Tibet. On d'Anville's map Dangra-yum-tso is called Tankin Yamso L and on the Ta-Ch'ing map L Tang la you mtso, and between Dangra-yum-tso and Tengri-nor there is, on d'Anvilles map, 140 years earlier, a series of four lakes, corresponding to Mokieu Cho, Bul Cho and the Ring Cho Lakes on the Pundit's map, although not specially mentioned in his text. D'Anville has a Tarcou MM, and the Ta-Ch'ing, on the same place a Mt Tarkou, both, of course identical with Nain Sing's Targot Lha. The Chinese spelling is so far more correct that the name should be written without a *t* at the end. When Nain Sing found that from Tárgot Lhá »extends eastward a snowy range», one may observe that such a range, with or without snow, is also to be found on d'Anville's map. These details were, more or less changed according to every mapmaker's personal taste, upon European maps during the first three quarters of the last century. Such is for instance the case with Berghaus' map of Asia where the lake is called Dhwang la yu mtso, whereas Tarcou MM has no name. All this is, of course, taken from Chinese maps.

Then comes, not very long ago, a period when every bit of Chinese geography is abolished from our maps and blanks left instead. But even if this had not been the case, it would have been mean to diminish the merit of Nain Sing. For if we were to be scrupulous to an extreme, we should say nor did the Chinese discover Dangra-yum-tso and Targo-gangri, as both were very well known to the Tibetans hundreds of years back. From a serious geographer's point of view Nain Sing will always and with absolute right be called the discoverer both of the chain

[1] In the Pundits Itinerary it is said 21 000 to 22 000 feet (Ibidem p. 129). On the map there are two peaks, 21 100 and 20 700 resp. On the map: North-eastern Frontier (second edition) Sheet Nos: $\frac{5-12}{6-13}$, published April 1908, the highest point of the Gyákharma group is given as 20 700 feet. Thus in different maps and texts the height varies within 2 100 feet.

of lakes between Dangra-yum-tso and Tengri-nor and of the mountains south of them, so far as his eyes could reach.

Sir CLEMENTS MARKHAM was aware of the importance of the discovery. He says: »To the south were the snowy peaks of the northern Himalayan range (Gangdis-ri), which the Pundit traced for a distance of 180 miles.» And in his *résumé:* »a system of numerous lakes and rivers was discovered, the existence of the vast snowy range of the northern Himalaya (Gangdis-ri) was clearly demonstrated, several peaks were fixed . . .»[1]

In another place the same author says of the Pundit's journey: that it »is among the most important, as regards geographical discovery, that has been made in the present century»; of the lakes he says: »All these lakes are new to geographers, with the exception of Tengri-nor», and of the mountains: »To the south were the snowy peaks of the northern Himalayan range (Gangdis-ri), which the Pundit traced for a distance of 180 miles. The highest, called Targot-yap, is 25 000 feet above the sea.» Recapitulating the results he says: »The existence of the vast snowy range of the northern Himalaya (Gangdis-ri) was clearly demonstrated.»[2]

In all these utterances we recognize the original account of Trotter, who in his own *résumé*, says: »The existence of a vast snowy range lying parallel to and north of the Brahmaputra River has been clearly demonstrated and the positions of several of its peaks have been laid down, and their heights approximately determined.»[3] The conception of the range was stereotyped in such words and could hardly be otherwise, as no other material existed about this range, which had proved to be so difficult to approach. Markham's papers are also only extracts from Trotter's excellent account. To his article in the Geographical Magazine E. G. RAVENSTEIN has drawn a very good map, which is, however, as far as the Transhimalaya is concerned, the contrary of »a clear demonstration». It leaves a blank where the Transhimalaya is really situated and it cannot, of course, enter any other peaks than those seen by Nain Sing and which belong to the northern parallel ranges. In opposition to Hodgson and Saunders Ravenstein suggests that the Nien-chen-tang-la range stretches uninterruptedly to the W.S.W., finally following the northern bank of Raga-tsangpo and completely ending in a high peak, Hurkiang, E.N.E. of Saka-dsong. This peak taken from Nain Sing's survey 1865—66 is difficult to identify. It is, however, situated near the Chaka Chu or Sachu-tsangpo and forms the western end of Nain Sing's »High snowy range», which I have tried to identify as the eastern half of the Kanchung-gangri. West of Chaktak-tsangpo, but farther north, is a range, which seems to be in some connection with the Kailas and is broken through by no fewer than three rivers. The name Gangdis-ri is not used, nor any other name.

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[1] A Memoir on the Indian Surveys, London 1878, p. 163 and 165. Sandberg and Holdich in their books on Tibet and Tibetan exploration do not even mention the discovery of these mountains.

[2] The Geographical Magazine, Vol III, 1876, p. 145.

[3] Trotter, l. c. p. 121.

The vast snowy range is not, as Markham believed, a western continuation of the Nien-chen-tang-la and cannot, therefore, alone, be called the northern Himalaya, as no range of the southern Himalaya, alone, can be called southern Himalaya. Only when the whole system is regarded as a whole, can it be called the northern Himalaya. The ranges Nain Sing has seen from his route are only a part of the system, situated north of the western continuation of the Nien-chen-tang-la which is the back-bone of this eastern section of the Transhimalaya.

In the discussion which took place after Trotter's paper had been read, and which, in spite of Sir HENRY YULE's presence, was far from important, TREL. SAUNDERS said: »no one who had studied Himalayan geography could fail to feel grateful for the two vertical sections across the mountains down to the Tsangpo, by Pundit Nain Sing, one of which was described in the paper. Those sections had thrown a general light on the whole subject».[1]

How very right and how different from the view that it should be sufficient to see a landscape from a distance to draw a tolerable map of it. He does not say a word of the western continuation of »the range», he only talks of the two transverse crossings, which had been accomplished in 1871—72. He takes, however, the subject too easily when he says that these two sections have thrown a general light on the whole of these mountains. His starting point was critically and scientifically correct, but his conclusions wrong when he believed that the system was built on the same pattern the whole way, namely, as on the crossings over Khalamba-la and Dam-largen-la.

If in the discussion in the Royal Geographical Society, on May 14th 1877, Nain Sing was not fully appreciated, he had a sort of revenge in the discussion after my paper, on Febr. 23rd, 1909. Sir Henry Trotter, the great and noble protector and able collaborator of the Pundit, said: »that Nain Sing in his passage through the lake district, fixed the position of numerous snowy peaks to the south of his route for a distance of several hundred miles; many of these correspond well with Sven Hedin's work».[2] There are, however, only two peaks, which I am able to identify, namely, the Shakangsham and the Targo-gangri. As I cross or approach the Pundit's route only near Dangra-yum-tso and Ngangtse-tso, I can, so far as Transhimalaya is concerned, only speak of this section of his route, not of sections farther west which do not belong to Transhimalaya, and not of the itinerary eastwards to Tengri-nor where I have not been. But for the section in question I cannot identify any other peak than Targo-gangri.[3]

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[1] Proceedings Royal Geogr. Society. Vol. 21, 1876—77, p. 348.

[2] Geographical Journal, Vol. XXXIII, 1909, p. 419.

[3] On the same occasion Doctor LONGSTAFF said: »I wish to draw attention to that range of snow mountains discovered by Nain Sing in 1874, and along the northern side of which he travelled for more than 800 miles.» He adds that he is uncertain whether I include this in my Transhimalaya, which is surprising as I had just precised the extension of the system in the following words: »in the north I should say the belt of central lakes, the eastern discovered by Nain Sing, the western by me,

To return to Nain Sing's report, he saw a snowy range extending from Tárgot Lhá to the east. There is no sign of such a range in reality. East of Targo-gangri there is a broad, open valley and east of it comparatively low mountains. But south of Ngangtse-tso and Marchar-tso, Nain Sing's Darú Cho, there is a range, stretching east and west, which I have called Ngangtse Range, no other name existing. It is impossible to reconcile Nain Sing's ranges with facts. South of the eastern end of Ngangtse-tso he has two ranges at resp. 22 and 37 miles' distance. The latter may be meant to be the water-parting, although this is in reality 45 miles south, namely, the great range Pabla which is the western continuation of Nien-chen-tang-la. South of the S.E. corner of Dangra-yum-tso Nain Sing has a range at 10 miles' distance, whereas in reality the principal range is at 55 miles from the same point. From Tárgot Lhá to Gyákharma peaks the snowy range is given as 180 miles long, which must be along all the windings and bends of the range, for else the distance between the two terminal peaks is only a little over 140 miles. These mountains along the western shore of Dangra-yum-tso are the best, but the southern ranges are very uncertain, which is not surprising, for from Nain Sing's route there is no possibility to judge as to their situation.

As the orography is wrong one could not expect much of Nain Sing's hydrography. Nobody had heard of his Dobo Dobá Cho, supposed to be in connection with Kyáring Cho by the river Duba or Párá Sángpo. All watercourses in this region go with the Tagrak-tsangpo to the west end of Ngangtse-tso, or exactly in the opposite direction. But there is a district Tova-tova south-east of Ngangtse-tso. Trotter may be said to be right in his supposition that Nain Sing's southernmost range is not the watershed of the Brahmaputra, for this is situated further south. When I had crossed the Sela-la I expected to come down to a river flowing east and north-east and piercing the Nien-chen-tang-la to Kyaring-tso. For south of his southernmost range Nain Sing has a rather long river, Dumphu or Hotá Sángpo going to that lake. But in reality all watercourses streamed westward and belonged to the Brahmaputra system. So the Ota-tsangpo, as the river was called, proved to be much shorter. Of the lakes Ngangon Cho and Siro Cho I could get no information and those Tibetans I asked had not heard the names. The twin lakes Mun-tso were known and said to be situated west, not south of Dangra-yum-tso. Every-

is a quite natural and practical boundary», and I had even given the names of all the lakes situated in the depression which I regard as the northern boundary of the system, a view that is strongly corroborated by the geological structure of the whole system. But it is more surprising that he says that Nain Sing had travelled more than 800 miles along the northern side of a range of snow mountains. Such a view could be accepted in 1874 when Walker wrote his general report, for then Nain Sing's journey stood quite alone in these parts of Tibet. But in 1909 even a rather elementary geographical knowledge would be sufficient to understand that there is no snowy range, 800 miles long, south of Nain Sing's route, but that there are innumerable ranges, most of which are bare of eternal snow. Between 1874 and 1909 the whole history of exploration in this interior part of Tibet is included. From the definition I had already given of the physical boundaries of the system, it was easy to see that Nain Sing did not at a single point come in contact with Transhimalaya, before he moved eastwards from Ngangtse-tso into regions which are still known only from his description.

thing the Pundit saw with his own eyes is wonderfully well and correctly surveyed, but for the country south of his route, which he only saw from a distance and where he depended upon native information is not an improvement upon the Chinese maps.

West of Dangra-yum-tso Nain Sing has, with dotted outlines, a lake he calls Tede Námcho, which he must have heard of on his route between Tashi-bup-tso and Dangra-yum-tso. The situation he gives it on his map is nearly correct. The form he gives the Dangra-yum-tso is probably wrong as it is impossible to get an idea of it from the northern shore. He certainly exaggerates its dimensions when saying it has a circuit of about 200 miles. On the map it is only 140 miles. He says it is 45 miles long, which may be right, whereas 25 miles broad seems to be exaggerated. The water is slightly brackish. Kyaring-tso is 40 miles long and 8 or 12 miles broad. It is perfectly fresh as most lakes to the east are. He says a river, Nak-chu, was found to leave the Tengri-nor from its N.W. corner and join the great Nak Chu Khá of Chargut-tso. He believes the drainage of all the other lakes goes to Chargut-tso which he makes twice as large as any of them. The information he obtained about the whole drainage caused much confusion and Trotter is quite right in saying the evidence in its favour is not sufficiently strong to justify his entering into the subject at length.[1]

Ombo, on the northern shore of Dangra-yum-tso was the chief village of a district called Nakchang Ombo. This and some other villages with stone huts produce a profusion of barley. Nakchang Gomnak farther east was totally devoid of cultivation. The Tang-Jung-tso north of Dangra-yum-tso was believed by the Pundit to have once been connected with the latter. I cannot judge in this matter as I passed north of Tang-jung-tso, but the Pundit may easily be right as beach-lines of a considerable height surrounded the shore-plains south of Dangra. The Pundit also heard of Sasik Gomba, or Särshik-gompa as I heard it called, and gives a good description of the Pembo sect. The whole of Nakchang was subordinate to the two *Jongpons* of Senja Jong as nowdays.[2]

A cart might be driven all the way from Noh as far as to Ombo without any repairs being made to the road, a statement that is much exaggerated, at least for the passage between Tashi-bup-tso and Dangra-yum-tso. The plateau traversed was found to be 15 000 to 16 000 feet in height. »The plain is, as a rule, confined between mountains which run parallel to the direction of the road, but a few transverse ridges of considerable elevation are crossed en route.» As a rule the drainage tended to the north.

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[1] DUTREUIL DE RHINS does not accept the hydrography of Chargut-tso as represented by Nain Sing. According to the Pundit the river of Chargut-tso should go to Tsiamdo and be identical with Mekong. »On voit par là, ce que valent les renseignements de ce genre, recueillis auprès des indigènes qui font communiquer toutes les rivières les unes avec les autres . . .» L'Asie Centrale, Paris 1889, p. 491.

[2] Nain Sing often writes *ch* instead of *ts*. He writes *cho* instead of *tso*, and Nakchang instead of Naktsang. Senja Jong is pronounced Shansa-dsong.

Along the northern and eastern shore of Tengri-nor the Pundit followed the road which had already been surveyed in 1872, so far as to Dam, from where he took a more western road. He calls the water-parting pass in the head range Dam Lhargan-la (16 900 feet), which is identical with d'Anville's Larkin MM, and the Larganla of the Ta-ch'ing map. Going S.W., south of the pass, he obviously follows a longitudinal valley running parallel with the Nien-chen-tang-la range from S.W. to N.E. The upper part of the Ki-chu valley is called Lháchu. »There are several scattered hamlets in the Lháchu valley, which is bounded on the north by the Ninjinthánglá snowy mountains, at the southern foot of which is a thick belt of low forest.» To judge from his map the range is, for its section south of Tengri-nor, very sharply defined both north and south.

Crossing the Baknak Pass (17 840 feet) he enters the Tulung-chu, a northern tributary to the Ki-chu, which takes him steadily down to Lhasa. His map indicates several southern ramifications, more or less intimately connected with the main range, Nien-chen-tang-la.

From Lhasa he turned south-east crossing, in Gokhar-la (16 620 feet), the range between Ki-chu and Tsangpo. From this pass the Nien-chen-tang-la peaks were visible. From Chetang he went up the southern tributary Yalung, and crossed the main Himalayan watershed in Karkang-la (16 210 feet). Thence he went down to Tawang and Brahmaputra and reached Calcutta on March 11th, 1875, after having covered 1 200 miles of absolutely new country.

The same summer when Nain Sing started on his famous journey, another native explorer was sent into Tibet from the south. The results are communicated by Lieut. Colonel Montgomerie and the itinerary is contained in the title of his paper: *Extracts from an Explorer's Narrative of his journey from Pitorágarh, in Kumaon, viâ Jumla to Tadum and back, along the Káli Gandak to British Territory.*[1]

From the west, i. e. from the river Bheri, a left or eastern tributary to the Tibetan Map-chu, the native explorer of 1873 entered the basin of the Kali-gandak. The pass, Digi-la, between the two was found at 16 879 feet. From Kagbeni he followed up the lastmentioned river. At Changrang the Loh Mantang Raja has a winter residence. His journey falls chiefly within Nepal and I will only quote his description of his passage over the Photu Lá on the Tibetan frontier, which is identical with the pass my Tibetan guides called Kore-la. Perhaps Photu-la is the name used on the Nepalese side, and Kore-la that used by the Tibetans. The explorer makes it 15 080 feet, whereas I got 15,288. He says: »Leaving Loh Mantang on the 19th, I crossed the pass Photu Lá on the 20th. the boundary between Debajúng in Lhásá (Thibet) and the Nepál possessions. The pass is about 15 080 feet above the sea. There is a descent of about 250[2] feet from the pass on to the

[1] Journal Royal Geographical Society, Vol. 45, 1875, p. 350 et seq.
[2] I found it to be 315 feet.

plain below . . . On the 21st I encamped at Chumikgiakdong, a sheepfold on the stream which flows to the west of the plain. Leaving my things at Chumikgiakdong, I went to Labrang Koja, an encampment distant 9 miles. The river is here about 250 feet wide and has a very gentle current. It is crossed by boats made of yak's hides which are sewn at the ends and are attached to sticks at the sides. Next morning, the 23rd, I started for Loh Mantang,[1] and crossed the Cháchú Sángpo 2 miles above its junction with the Brahmaputra. This stream is about 3 feet in depth and 60 feet wide, and comes from a snowy ridge about 14 or 16 miles north of Mantang;[2] I forded it, and going 3/4 mile farther on arrived at Tadum.»[3]

At the same place I found the breadth of the Tsangpo to be 360 feet and that of the Tsa-chu 106 feet. As the explorer does not give the depth of the Tsangpo and says the Tsa-chu is 3 feet deep, his dimensions must be regarded as very good and reliable, remembering that he travelled in September and I in June.

The map to this article[4] is very interesting and instructive showing how great the blanks still were in 1875. The Shang-chu and Ki-chu crossings gave a comparatively good idea of the orography of the eastern part of the system, but further west Montgomerie's map contained necessarily the same errors which had to disappear only in 1907—08, that is to say mountain ranges following close to and parallel with the northern bank of the Tsangpo, and pierced by the northern tributaries. At two places, however, we find fragments of ranges at some distance from the river, viz. between 85° and 86° East and at 87½° East. long.

On sheet N:o 71 (Provisional Issue) of *India and Adjacent countries* published in January 1904 the same two fragments are still to be seen. On Ryder's map they have disappeared.

We have followed the journeys and results of the Pundits who, from 1865 to 1875, were sent to southern Tibet by Montgomerie and Trotter and who have contributed to our knowledge of the Transhimalaya. We have seen that the journey to Tengri-nor by crossing the Nien-chen-tang-la in Khalamba-la and Dam-largen-la was regarded as specially important as proving the existence of the high range south of Tengri-nor. But when Nain Sing, two years later saw and took bearings to a series of peaks on a section of 140 miles of his route the existence of a snowy range north of the Brahmaputra was regarded as clearly demonstrated. This view is both right and wrong. The journey of 1871—72 traversed the whole system, pierced to the very heart of the Transhimalaya and gave two complete profiles across the system. Thus, in spite of the 85 miles of snowy ranges Nain Sing had seen north of the Tsangpo in 1866, his journey in the Tsangpo valley was not re-

[1] Misprint for Tadum.

[2] This must be a misprint, for the junction is 33 miles, north of Mantang, and the mountains from where the Tsa-chu comes double as much. He returned by Loh Mantang and Kali-gandak.

[3] A map of the Pundit's journey across Photu-la or Kore-la is to be found as Pl. XXIV in Vol. II.

[4] Journal Royal Geogr. Soc., Vol. 45, p. 299.

garded as demonstrating the existence of a range to the north and Montgomerie does not even discuss its probability, a fact that should be compared with the beautiful results of the Tibet Frontier Commission in 1904, which, following the same route as the Pundit, could not prove much more than he regarding the interior of the system.

As Nain Sing had only touched the southern edge of the system, Montgomerie desired to penetrate, through his emissaries, the interior of these mysterious mountains and sent the explorer of 1871—72 to Tengri-nor. He understood that only transverse complete crossings had any value and that latitudinal itineraries south or north of the system were hardly worth speaking of. Therefore Nain Sing's journey in 1873—74, during which he saw a snowy range to the south, was, in relation to the Transhimalaya, not less peripheric than the journey of 1865—66. But if he had crossed the system in any other pass than Dam-largen-la, which was already known, he would have rendered a very important service.[1]

In spite of their splendid work during ten years the Pundits have only accomplished four crossings, namely over Jukti-la, Sarlung-la, Khalamba-la and Dam-largen-la. Of these I know only the first from personal experience and shall later on describe it. The second is obviously situated in the principal, water-parting range of the Transhimalaya, although I have not been able to find any detailed description of that itinerary, which brought one of Montgomerie's explorers from Tok-jalung down to Manasarovar. From this journey date such names as Shiakma Khabjior and Ruldap-tso which I could not identify at the source of the Indus, nor at Ngang-laring-tso. But the last section of the route, as it is given on the Gazetteer map of Kumaun and Hundes (Vol. II, Pl. XV), goes over the Sar-lung Pass and down in a valley called Bhachong Chin leading to the north-eastern corner of Manasarovar. This valley is identical with my Pachung which goes close east of Mount Pundi. I went up a short distance in this valley and got convinced of the existence of a road, which was however, used only by horse-thieves and robbers. This road runs close west to and nearly parallel to the road I followed from Surnge-la to Tokchen. The distance between Surnge-la and Tokchen is, as the crow flies, 21 miles, and between Sarlung and the shore of Manasarovar exactly the same. Thus Sarlung and Surnge-la must be situated in the same range. I am not, however, sure whether the two passes are not after all one and the same. If not, the distance between them must be only one or two miles. As the range is very low in this region there may be several passes easy to cross. But as all the rest of the native explorer's route

[1] My old teacher and friend Baron von Richthofen in Berlin used to say that journeys along the latitudinal valleys of Tibet were of comparatively little interest and value as they kept to lines which did not change their topographical features for hundreds of miles, and because very little could be known of the geological structure. Everybody who wished to explore Tibet seriously had to lay his journey in the meridian or diagonally through the country so that he got an opportunity to cross as many ranges as possible. Only on such meridional lines could the topography and geology become known.

lies west of mine and as both routes *may* touch each other only in the pass, I prefer to regard both as two different crossings, although situated quite close to each other.

In the east, speaking only of the parts of the range near Tengri-nor, only two Europeans have crossed the Transhimalaya, LITTLEDALE in Goring-la and DE LESDAIN in Khalamba-la. They have not added any new information about the system, whether they did not understand the importance of the problem or because both had their wives with them I do not know. Littledale, at least, took a new pass, which is always something to be grateful for.

At the distance of 485 miles between Surnge-la and Khalamba-la nobody has ever crossed the system before 1907. So, considering as a whole the results of the Pundits' journeys in connection with the Transhimalaya and admitting the great importance of their work, which occupies an epoch in the history of exploration in Tibet, we must say that they left the whole central part of the mountain system unknown, when their work was finished. They had crossed it at its extreme ends in four passes; otherwise they had only travelled along its borders and entered on their maps some of its peripheric peaks. The rest, that is to say, the whole central bulky massive, the orographical building, the geological structure, the hydrographical systems, the nature, the distribution of nomads and shepherds, the existence of villages, monasteries, roads, everything was quite unknown. Although Montgomerie says that he never took his attention from the country north of the Tsangpo, he does not seem to have realized the importance of this field of exploration. His Pundits were sent to the uppermost Indus, to the gold-fields of western Tibet, to Shigatse, Lhasa, and Tengri-nor, up and down the Tsangpo valley, across and along the Nepalese frontier and so forth, but never across the mountains north of the Tsangpo, upon a line of 485 miles. Did he regard this system as sufficiently well known from Chinese sources and Hodgson's map? I have shown above that this was not the case. At any rate the Central Transhimalaya was left alone and when, some 40 years later a European expedition entered these parts of the mysterious country, it was, by circumstances, forced to follow Nain Sing's road and to improve his rough reconnaissance into a mathematically correct survey. But it did not approach the interior any nearer than Nain Sing had done.

The British method of using intelligent Pundits as surveyers of unknown Tibet has only to a very small extent been followed by the Russians. Thus ZYBIKOFF was sent to Lhasa not very long ago, and returned with a description and a collection of photographs of the sacred city. Although he crossed Transhimalaya he has, of course, nothing to tell us of this mountain system. The Russians, however, have tried to draw some information from journeys undertaken by natives. In the *Isvestiya of the Imp. Russ. Geogr. Society*[1] J. P. SHISHMAREV and Baron FR. VON DER

[1] Vol. IX, Nr 6 and translated in Petermann's Mitteilungen 1874, Band 20, p. 47 et seq.

OSTEN SACKEN have communicated the itinerary of an embassy from the Gigen Khutukhtu of Urga to Lhasa in 1873. The embassy was joined by a great number of Mongolian hunters and pilgrims. More than a thousand camels were loaded with provisions for the journey and with presents to Dalai Lama and Tashi Lama. The mission travelled through Ala-shan and *viâ* Sining to Koko-nor. In the regions where the Tungan revolt was not yet quite finished the travellers had a Chinese escort in addition to the forty Mongolian soldiers who accompanied them the whole road.

Only the third part of the itinerary to Lhasa is of some interest to us. I give only the names: Ike-ulan, Baga-ulan, the rivulet Chirimtaï, Dynchin, Nukutu-daba, a pass belonging to a range of the same name; Dolon-kit, Sergei, two small rivers called Balangataï and Dalan-turu; Zaidan-bain-gol, the river of Tsaidam; the frontier of the two Koko-nor-princes or *Dsasaks*. Two roads are reported to exist from the frontier of the two *Dsasaks*, the eastern crosses the mountain Burkhan-bogdo, the western goes round this montain to the river Balanantaï. The northern slope of the Shugei mountain; Gunjai-gardsa on the southern slope of the Shuga mountain. From here 19 days' journey traverses uninhabited country, and the road seems to be the same as that taken by Huc and Gabet. Buchui-zagan a mountain and a lake; two springs called Solongo-khongor and Kuitun-shara; the mountain Bayan-khara-ula; Zagan-obotu near the great river Galdsur-ulan-muren; Zagan-tologoi not far from the river Mur-usu: Burkhan-busu, Lama-tologoi a mountain; Kuku-tchilu (Ko-ko-shili?) and the river Mur-usu; Dumbyr on the same river; Inderi-noor, a lake; Nubtshitu-ulan-muren (Napchitai), a tributary of Mur-usu; Camp on the bank of Mur-usu after passing Bokhumanai (Buka-mangna?); Adag-kharzag a mountain south of Mur-usu; a river at the foot of mount Dunda-kharzaga; mount Ushige; hot springs at the southern foot of Ushige, which is the same as Tang-la, from where Tibet is supposed to begin; Bundse-shil, Bukgei-gol, Zulmara a lake; Khara-usu (Nakchu), Yarmany, Lalun-garbu, Santshun, Choindon-jarba, Ladun, Khlakhandun, Pundo, northern foot of the range of Chagala, Synchu-dsong, Charara-chamo, Gandu, and Lhasa. Though many of the names are uncertain, they prove that the Mongolian pilgrims to Lhasa use their own names for the whole route, probably known for centuries and used by many generations.

CHAPTER XIX.

ABBÉ HUC.

Under such conditions, as those set forth in the preceding chapters, it is really a hopeless task to search for information about the Transhimalaya in the geographical literature of Europe. What I have related so far, the best, fullest and most important, — although not always the most reliable sources, are, to the greatest extent, Asiatic. For from the early missionaries we got next to nothing at all. Klaproth, Ritter and Humboldt took all their information from Chinese sources. The Pundits did excellent work in the west and east and on the periphery. Thomson and Cunningham in the west and Hooker and Campbell in the east, all of them belonging to the most excellent explorers of Asia, had no opportunity to penetrate into Tibet. And beyond these sources, what did we know of the Transhimalaya? Has anybody dealt with the problem in a monographical and scientific way? Even the Chinese texts are extremely meagre. In Ritter and Humboldt we find only a few passages. Hodgson touches the problem more *en passant* and in a way that remains beneath all serious criticism. We shall see later on what Saunders' suggestions are worth.

If Odorico de Pordenone and Grueber and Dorville were the first Europeans to cross the Transhimalaya, HUC and GABET are the first of whom we know with perfect certainty, although they passed our system without even mentioning it. But still their journey is, from a historical point of view very important. They proved beyond doubt the possibility of reaching Lhasa from Peking and of crossing, even during the winter, eastern Tibet. Their journey will for ever remain classic in the history of exploration in the land of the Lamas.

Only the section of Huc's and Gabet's journey which goes from Koko-nor to Lhasa concerns us here, and I will dwell upon some interesting passages in Huc's narrative.

Huc says the Si-Fan or Oriental Tibetans live along the mountains of Bayen-Kharat towards the sources of the Yellow River. He stayed here nearly a month. Towards the end of October 1845 the Tibetan embassy arrived and the two Lazarists joined it. So did also several Mongolian caravans en route. The caravan was very big: 15 000 »boeufs à long poil», 1 200 horses, 1 200 camels, 2 000 men, Tibetans

and Tatars. All the riding men were armed. There was also an escort of 500 Chinese and Tartar soldiers accompanying to the Tibetan frontier. »Quel étonnement pour ces vastes et silencieux déserts, de se voir à tout coup traversés par une multitude si grande et si bruyante.»[1]

From Koko-nor the caravan marched to the west, »turning perhaps a little to the south». After six days they had to cross the Pouhain-Gol, »rivière qui prend sa source aux pieds des monts Nan-Chan, et va se jeter dans la mer Bleue. Ses eaux ne sont pas très-profondes, mais étant divisées en douze embranchements très-raprochés les uns des autres, elles occupent en largeur un espace de plus d'une lieue». He gives a very graphic description of the passage, which was performed »admirably well», but not without difficulty. Two yaks were drowned and a man broke his leg.

PRSHEVALSKIY gives quite a different description of the river and, although he corroborates the statement that the river comes from Nan-shan, he has thrown some rather strong and very unjust doubt on Huc's reliability.[2] He writes the name Boukhaïn-Gol which is correct and means »the river of the yaks». Prshevalskiy says:

»Dans son cours inférieur, au point où passe la route du Thibet, cette rivière est large d'environ cinquante sagènes et partout guéable. Sa profondeur en certaines endroits ne dépasse pas deux pieds et n'est jamais importante. Grand donc fut notre étonnement en nous rappelant la description que fait le père Huc de ce Boukhaïn-Gol et de sa terrible traversée des douze bras du fleuve avec la caravane qui se rendait à Lhassa . . . — Cepeneant il n'existe qu'un seul bras au point où passe la route du Thibet; encore n'est-il rempli qu'à l'époque des pluies. La rivière est toujours si basse qu'à peine un lièvre pourrait s'y noyer; un pareil accident est inadmissible pour un animal aussi grand et aussi fort que le yak. Au mois de mars de l'année suivante nous sejournâmes un mois entier sur les rives du Boukhaïn-Gol, que nous traversions souvent dix fois pendant une seule excursion de chasse.»

To Huc's pretended observation of the tides in Koko-nor, Prshevalskiy says:[3] »J'ai voulu me rendre compte de la véracité de cette assertion en plantant des jalons et j'ai pu ainsi me convaincre qu'elle était complètement dénuée de fondement. En géneral, à partir du Koukou-Nor tout ce qu'avance ce missionnaire est entièrement erroné; j'en ai eu la preuve bien souvent.»

RICHTHOFEN has made a very fine and learned analysis of Huc's itinerary.[4] He does not find much geographical matter in the book, as the people, their life and religion, as well as his own personal adventures, seemed to occupy too much of Huc's attention. Richthofen shows that Huc crossed Bukhain-gol much farther to the west than Prshevalskiy. I would add that the river, even at the same season,

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[1] Souvenirs d'un voyage dans la Tartarie, le Thibet et la Chine, 1844, 45 et 46. Paris 1853, Tome II, p. 198 et seq.

[2] Mongolie et Pays des Tangoutes, Paris 1880, p. 230.

[3] O. c. p. 218.

[4] China I, p. 259 et seq.

may have a very different volume of water, for some years the oceanic precipitation may reach farther into the interior of the continent than other years.

Several travellers have crossed this river. LITTLEDALE, 1893, does not give any account of it. ROBOROVSKIY crossed it more than once on his journey, 1893—95, but his account is very meagre. He only says that where Noyon-khutul-gol joins it, the breadth is 30 *sashen*; the bed and the banks consist of boulders a half *arshin* in diameter. Lower down the river spreads in some branches, and still lower down in »many branches in a gravelly bed».[1] It would be easy to prove, by comparing all the different descriptions, that not two are like each other, as different travellers have crossed at different places and seasons. Littledale crossed the Bukhain-gol 55 miles from the mouth. If DUFOUR's map in Huc's book (Pl. XVIII) is in the least reliable, Huc crossed the river some 15 miles from the mouth whereas Prshevalskiy crossed it very near the point where the river enters the Koko-nor. In 1896, November 8th, I crossed the river some 25 miles (42 kilometres) from the mouth. I have described it in the popular account of that journey.[2] In the scientific description I give the following details: »At last we crossed the Bukhain-gol at a broad, comfortable place, where the bank terrace was hardly one metre high. The breadth of the main branch was 75 m, the average depth 0.25 m, the greatest depth 0.35 m, and the velocity 0.9 m, that is to say a volume of 17 cub.m a second. The water was clear and free from ice. Then follow two small frozen arms, with very little water. The three following beds were rather broad and mighty, but perfectly dry . . . Some 4 km further down we crossed another branch, being 30 m broad, 0.2 m average depth and 0.7 m velocity, thus carrying a volume of 4 cub.m. in a second . . . Between all these arms are low terraces with steep sides . . . and not inundated during the high water. But the now dry beds are filled in summer and some of them were still moist. The bed of the Bukhain-gol is therefore very broad and spread, and it is possible, as my guide asserted, to cross the river at this season almost at any point.»[3]

Thus I measured some 630 cub. feet water a second and the river was spread in seven arms, so there may easily have been twelve lower down where Huc crossed. There is no particular exaggeration in his description. Some accidents may even happen in such a great caravan. Huc seems to have crossed the river in the beginning of November as I did. Once he has »le lendemain» and once »cinq jours» before he comes to the 15th November, from which dates he must have crossed the river on the 9th of November or one day later than I.

Huc continues: »Le 15 novembre, nous quittâmes les magnifiques plaines du Koukou-Noor, et nous arrivâmes chez les Mongols de Tsaïdam. Aussitôt après

[1] Trudi Ekspeditsiy Imp. Russk. Geogr. Obshtshestva po tsentralnoy Asiy. Vol. II. p. 290 and 311.

[2] Through Asia, II, p. 1155.

[3] Die Geographisch-wissenschaftlichen Ergebnisse meiner Reisen in Zentralasien 1894—1897, Petermann's Mitteilungen, Ergänzungsheft 131, p. 332.

Carte de la Chine et des Etats-Tributaires, par A. H. Dufour, 1840. (The dark line is Abbé Huc's route.)

GEOG. STAB. LIT. ANST. STOCKH.

avoir traversé la rivière de ce nom, le pays change brusquement d'aspect. La nature est triste et sauvage; le terrain, aride et pierreux, semble porter avec peine quelques broussailles dessechées et imprégnées de salpêtre.» Which Prshevalskiy finds wrong: »Tandis qu'il n'y a que des marais non interrompus, pas une seule pierre et à peine quelques arbustes.» He finds it strange that Huc does not mention the southern Koko-nor range and that he has nothing to say about the difficulties of the crossing of the Baïan-gol or Tsaïdam river. It was frozen when Prshevalskiy crossed it. Richthofen shows that Huc crossed the river almost the same day as Prshevalskiy, November 15th, so the circumstances must have been the same in both cases.

Concerning his approach to Burkhan-Buddha Huc tells: »La caravane tout entière chercha à ramasser le plus de force possible pour franchir le Bourhan-Bota, montagne fameuse par les vapeurs pestilentielles dont elle est, dit-on, continuellement enveloppé.»

At 3 o'clock in the morning the approach began and at 9 they were at the foot of the range. Very graphically he describes the difficulties of the road specially on account of the poisonous gases issuing from the soil. This explanation which reminds us so vividly of Desideri and Beligatti, he got from the members of the embassy and believed firmly in it. Prshevalskiy again criticises his predecessor, explains the phenomenon scientifically, but does not seem to have crossed the mountains with less difficulties than the missionary, for he says:[1] »Bien que l'exhaussement y soit graduel, la traversée du Bourkhan-Bouddha est fort pénible par suite de la raréfaction de l'air. Les animaux et les hommes perdent peu à peu leurs forces; une faiblesse générale les euvahit, la respiration devient difficile et le vertige les saisit. Souvent les chameaux tombent foudroyés; un des nôtres périt ainsi et les survivants eurent beaucoup de peine à terminer l'ascension.»

On the southern side of the range Huc experienced a very heavy fall of snow and further south, to the next range, Shuga, the whole country lay covered under snow. The passage of the Shuga proved to be very difficult on account of the snow, cold and wind. Although Prshevalskiy's description of this range is of course much better and more detailed, there is nothing in Huc's account which does not agree with Prshevalskiy's.

Here begin the real hardships which have certainly not been exaggerated by the Lazarist missionary. It is the same story as every explorer who has crossed Tibet from north to south in winter has told:

»Les déserts du Thibet sont, sans contredit, le pays le plus affreux qu'on puisse imaginer. Le sol allant toujours en s'élevant, la végétation diminuait à mesure que nous avancions, et le froid prenait une intensité effrayante. Dès lors, la mort commença à planer sur la pauvre caravane. Le manque d'eau et de pâturages ruina promptement les forces des animaux. Tous les jours, on était obligé d'abandonner des bêtes de somme qui ne pouvaient plus se traîner.

[1] O. c. p. 246.

Le tour des hommes vint un peu plus tard . . . — Vers les premiers jours de décembre, nous arrivâmes en présence du Bayen-Kharat, fameuse chaîne de montagnes, qui va se prolongeant du sud-est au nord-ouest, entre le Hoang Ho et le Kin-Cha Kiang . . . L'endroit où nous franchîmes le Bayen-Kharat, n'est pas très-éloigné des sources du fleuve Jaune; nous les avions à notre gauche, et il nous eût fallu tout au plus deux journées de marche pour aller les visiter.»

He found the range completely covered with snow. After some discussion in the caravan it was decided to proceed.

»Nous nous mîmes donc à escalader ces montagnes de neige, quelquefois à cheval et souvent à pied. Dans ce dernier cas, nous faisions passer devant nous nos animaux, et nous nous cramponnions à leur queue. Ce moyen est sans contredit le moins fatigant qu'on puisse imaginer pour gravir des montagnes.»

Prshevalskiy is not satisfied with this description. He found that the Baïan-Khara-Oula rose rather gradually and that it was not very high. It is even possible to avoid it altogether, if following the Naptchitaï-Oulan-Mouren as he did. »Cependant le père Huc, dans sa narration, dépeint le Baïan-Khara-Oula comme un massif présentant des difficultés insurmontables»; to which Richthofen remarks that the snow in Huc's case made all the difference.

On the other side the caravan took one day's rest. »Nous quittâmes la grande vallée de Bayen-Kharat, pour aller dresser notre tente sur les bords du Mourouï-Oussou. Vers sa source, ce fleuve magnifique porte le nom de Mourouï-Oussou (eau tortueuse); plus bas, il s'appelle Kin-Cha-Kiang (fleuve au sable d'or).» Prshevalskiy reports that the road to Tibet follows the upper course of the river nearly to its sources in the Tang-la. This road is taken with camels; there is another over the mountains used by yak caravans.

Some days beyond Mur-ussu the caravan was divided into several parties on account of the meagre grazing.

Finally they reached the highest regions and were tortured by cold and heavy wind from the north. Many rivers were crossed on the ice. Ponies, mules and camels died in great numbers and forty men were abandoned. The health of Father Gabet gave way; he never quite recovered from the blow he got on the Tang-la and died before he returned to France.

»Nous commencions a gravir la vaste chaîne des monts Tant-La . . . Après six jours de pénible ascension sur les flancs de plusieurs montagnes, placées comme en amphithéâtre les unes au-dessus des autres, nous arrivâmes enfin sur ce fameux plateau, le point peut-être le plus élevé du globe . . . Des bords de ce magnifique plateau, nous apercevions à nos pieds les pics et les aiguilles de plusieurs immenses massifs, dont les derniers rameaux allaient se perdre dans l'horizon . . .»

It took them twelve days to cross the heights of Tang-la.

»La descente du Tant-la fut longue, brusque et rapide. Durant quatre jours entiers, nous allâmes comme par un gigantesque escalier, dont chaque marche était formé d'une mon-

tagne.» On the other side they reached hot springs with boiling water. The water stood in reservoirs of granite. »On rencontre frèquemment, dans les montagnes du Thibet, des sources d'eaux thermales.»

From Tang-la to Lhasa he remarks that the soil goes downwards the whole way. Once they camped in a great plain with excellent grass.

For some days they followed a long series of valleys, where sometimes black tents were to be seen and then they reached »the great Tibetan village», which is situated on the river Na-Ptchu, »designée sur la carte de M. Andriveau-Goujon, par le nom mongol de Khara-Oussou». This he found to be the first Tibetan station of any importance on the way to Lhasa. Among the black Tibetan tents he found some Mongol tents. He reckons about 15 days from here to Lhasa.

He now approaches Transhimalaya: »La route qui conduit de Na-Ptchu à Lha-Ssa est, en général, rocailleuse et très-fatigante. Quand on arrive à la chaîne des monts Koïran, elle est d'une difficulté extrême. Pourtant, à mesure qu'on avance, on sent son cœur s'épanouir, en voyant qu'on se trouve dans un pays de plus en plus habité . . .» Fields are to be seen and instead of tents there are houses. The shepherds have disappeared. Fifteen days from Nak-chu they reach Pampou which is regarded as the vestibule to the holy city. It is a beautiful plain watered by a big river. After three months of deserts this place appeared to them the most charming in the world. When Huc reached the last mountain wall before Lhasa, he seems to have forgotten all the hardships and miseries of Tang-la for he says, »mais c'était, sans contredit, la plus ardue et la plus escarpée de toutes celles que nous eussions rencontrées dans notre voyage». It took him and his companion nine hours to reach the summit. On January 29th, 1846, they reached the holy city after a journey of 18 months from the »Black Waters» in Manchuria north-east of Dolon-nor.

For his analysis of Huc's journey Richthofen used the Chinese map published at Wu-chang-fu in 1863, further Prshevalskiy's preliminary report together with the remarks of Ney Elias in the *Proceedings of the Royal Geographical Society* for 1874, p. 76 et seq., Prshevalskiy's map, and the itinerary from Urga to Lhasa, which was given to the Mongolian embassy by the Chinese Government.[1]

Richthofen writes Koïram,[2] but has nothing to say of the name or the range. A. H. Dufour has Mts Koiran. In d'Anville we find Coïran MM. It is very probable that Huc never heard any name for this range during his journey and that he has got his Koïran from Dufour, who himself got it from d'Anville. It is curious that Huc could cross the eastern Transhimalaya without hardly noticing it, or, at any rate, without having anything special to tell about this great system. Pampou, on the other hand, he makes the worst of all the mountains he had to cross. It is true

[1] Comp. Petermann's Mitteilungen, 1874, p. 48.
[2] China. I, p. 263.

that the Penbo-la, just north of Lhasa, is 5 575 m. high, so it may be even higher than the water-parting pass in the principal range. Huc probably crossed this range in Shangshung-la, which, as stage N:o 85, is to be found on the Chinese-Mongolian itinerary under the form of Santschschun.[1] Through this pass, Shangshung, A—K— also travelled, and it seems to be the one crossed by the Mongolian pilgrims' highway to Lhasa.

Huc's journey is one of the most remarkable ever undertaken through Tibet and his book the most delightful ever written about this country. Prshevalskiy uses every possible opportunity to throw some shadow over Father Huc. But Richthofen remarks that Huc's geographical observations are perfectly reliable and that their meagreness depends upon the terrible cold he had to endure during a winter journey in those inhospitable regions. With our present knowledge of the country it is easy to see that all the names Huc has given are correct. Burkhan-Buddha, Shuga, Bayan-khara, Mur-ussu, Tang-la and Penbo-la, are all correctly placed in his description. Over the whole book there is an atmosphere of perfect honesty and love of truth.

DUTREUIL DE RHINS has said of his famous countryman: »Un robuste chasseur, rompu aux plus dures fatigues, qui suivrait les traces du P. Huc, avec une sérieuse escorte et en s'entourant de tout le confort possible, trouverait sans doute quelque exagérations de style dans certaines descriptions de M. Huc; mais il nous semble que, voyageant plus simplement ou dans les mêmes conditions que ce missionnaire, la plupart des Européens seraient impressionnés de la même façon que lui . . . Les récits de M. Huc doivent inspirer une entière confiance . . .»[2]

With such defenders Prshevalskiy's criticism has done very little harm to Huc and his *Souvenirs*.

It is easy to see from Dufour's map in Huc's book, that Dufour and Huc have not worked together, for none of the high ranges mentioned by Huc have been entered on the map, except Koiran. Even Tang-la is missing. There is a Baïn khara oola, but in quite a wrong place. There is a Bassa doungra oola south of Mouroui-oussou, resembling the range of the same name on Berghaus' map and probably originally meant to be the Tang-la range. Huc's description of the ranges which is very clear and correct and even gives the impression of parallelism, does not at all agree with the fantastic arrangement on the map, which is dated 1840 and thus drawn several years before Huc's journey. As it was, however, published also in Huc's book, it ought to have been improved from his descriptions.

Still there are some interesting features on Dufour's map. The Mts Koiran are continued to the N.E. by a range, which is pierced by all the Indo-Chinese rivers going east and S.E. This range returned later on in Richthofen's »Sinisches System» and on Saunders' maps and others. To the west the Koiran range continues the

[1] Petermann's Mitteilungen, l. c. p. 49.
[2] L'Asie Centrale, p. 188.

whole way north of the Tsangpo to the Kailas. It is not difficult to find the source. The range is pierced by two northern tributaries, namely, the Naouc Tsanpou and the Sanki Tsanpou of d'Anville. So when Saunders made Nain Sing's Charta-Sanpu pierce his Gangri range, it was not an invention of his own, for the same experiment had been made 35 years before by Dufour. The great difference between d'Anville and Dufour was, that Dufour joined d'Anville's several ranges to one great single range, exactly corresponding to Humboldt's Dzang range.

Dufour had no reason whatever not to accept d'Anville's Tarcou Tsanpou, which he calls Dargou-zzang bo tchou and represents as flowing along the northern foot of the Koiran range. In this as well as in the case of the two northern tributaries Dufour has followed Berghaus' example. Humboldt has wisely not gone so far as to lose himself in too uncertain details.

From Kailas to the west the range divides like a fork, one branch being the Ladak range of Burrard, south of the upper Indus and its Gartang branch, the other stretching first N.W. and then turning to the N.E., under the name of Mt Ghangri, which, in an extraordinary way and at right angles, crosses a combination of the Kara-korum and Kwen-lun, called Mts Thsoung-Ting[1] on the map. Here Humboldt comes nearer the reality. Thus Dufour's Ghangri range is meridional and forms a cross with the Thsoung-Ling, resembling the cross Humboldt made of Bolor and Mouztagh or Tien-shan farther north. That Dufour really means the Kara-korum can be seen from the well-known pass in its western part called Défilé Kara-korum, which is situated in his Thsoung-Ling. It should be remembered that already in 1840 the name Mt Ghangri was used for a Tibetan range in uninterrupted continuation of the Transhimalaya, but situated at the sources of Keriya-darya.

A long way east of the Ghangri the Thsoung-Ling forks, the northern branch being Baïn khara oola, the southern Bassa doungra oola. The latter, after some curious roundabout ways goes down S.E. and south between Yang-tse and Mekong. Disregarding all the quite natural mistakes of his map, the interesting fact remains, that Dufour makes the range, in which the Kara-korum Pass is placed, continue through the whole of Tibet, nay even continue between the Indo-Chinese rivers. Its Central-Asiatic part runs straight from west to east on the 35° N. lat., instead of describing a bend to the south. Dufour has anyhow suspected that a great mountain system went through the whole of Central Asia, a view in which he must have been influenced by Klaproth and Humboldt. Further westwards the Thsoung-Ling turns N.W. and N.N.W. and forms, under the famous and unfortunate name of Bolor-tagh the western boundary-wall of Eastern Turkestan.

Hardly anybody has written about Eastern Tibet without quoting Huc. In the middle of the last century he was one of the greatest authorities on Lamaism. as may easily be seen from Köppen's work. As a geographer he will never be re-

[1] Obviously misprint for Thsoung-Ling.

garded as an authority. With full right Sir HENRY YULE says of him: »As regards a large part of the country of which I am going to speak we are all on a level, for no one has seen it, not even the clever Abbé himself and his companion; and of geographical information regarding the region in question, they can hardly be said to have brought anything back.»[1] And still his name will live for ever in the history of exploration in Tibet, the modern epoch of which he inaugurated as one of the most brilliant and intrepid pioneers of any time.

[1] Introductory Essay in: The River of Golden Sand by Capt. William Gill, London 1880, p. 18.

CHAPTER XX.

SCHLAGINTWEIT, LASSEN, DREW, H. STRACHEY.

It is of great interest to follow, step by step, the history of human knowledge regarding a mountain system such as the Transhimalaya. I have already been able to show how hard and obstinate the work has been and how difficult the conquest. No other mountain system on the earth can in this respect be compared with the Transhimalaya. The history of Himalaya becomes lost in the darkness of Indian hymns and we recognize it in the classic literature of Asiatic geography. The Kwen-lun is a more modern conquest. And still, on mount Kwen-lun the Chinese mythologists placed the abode of the immortals and of the supernatural beings who govern the surface of the earth.[1] The system is marked roughly on certain maps from about 1730, as will be shown later on. But only some fifty years ago Kwen-lun was proved to exist and was accepted on our maps as an independent system. Concerning the Kara-korum a long struggle has been fought before it was definitely recognized. But the most difficult problem to solve has been the Transhimalaya.

While Himalaya, Kwen-lun and Kara-korum have been mentioned and discussed inumerable times a deep silence has been hanging over the Transhimalaya. No struggle had, before 1909, been fought about it. Most geographers ignored it completely, others accepted silently either d'Anville or Klaproth. Hodgson could draw mountain ranges in Tibet without meeting a word of criticism. What could be said for or against a system, about which nobody had the slightest knowledge?

I am now going to relate in a few quotations the contributions of the brothers Schlagintweit. In their many writings our system occupies a rather humble place. In an article: *Physikalisch-geographische Schilderung von Hoch-Asien* ROBERT VON SCHLAGINTWEIT has given an excellent *résumé*, so far as the country was known in 1865.[2] He reviews the serious start against the unknown heights undertaken by British officers and scholars. Their observation that the snow limit was higher on the northern slope than on the southern of the Himalaya, which gave rise to a good deal of opposition, was believed by Humboldt who also explained the cause.

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[1] Klaproth in the Nouveau Journal Asiatique, Tome XII. Paris 1833, p. 232.
[2] Petermann's Mitteilungen, 1865, p. 361 et seq.

The Schlagintweits were the first Europeans to cross the whole breadth of High Asia, from India to Eastern Turkestan, and to give a detailed profile of the crossings from south to north. They regarded as one of their principal results the proof that Himalaya was only one branch of High Asia. They subdivided the mountains into three »ranges»: Himalaya, Kara-korum and Kwen-lun.

By using Chinese material Klaproth and Humboldt had arrived at the conclusion that a system, Kwen-lun, existed in the north. But this was only a supposition, which had not been proved. The three brothers Schlagintweit were the first not only to prove the existence of Kwen-lun but also of that of the Kara-korum.[1] »Man hatte vor uns den Kara-korum von untergeordneter Bedeutung gehalten, man hatte ihn nur als einen Ausläufer, als eine Verzweigung des Künlün betrachtet.»

Robert v. Schlagintweit describes the second principal range of High Asia in the following words:

»Dieser bildet die centrale Kette, er läuft dem Himálaya nahezu parallel, er ist eben so lang wie dieser. Der Kara-korum hat zwar nicht dieselbe grosse Anzahl von hohen Gipfeln wie der Himálaya, aber er übertrifft ihn in Beziehung auf seine mittlere Erhebung über das Niveau des Meeres.»

Of the situation and general features of Tibet he says:

»Zwischen dem Nordabhange des Himálaya und dem Südabhange des Karakorum liegt Tibet; nördlich vom Karakorum treffen wir Turkistan . . . Was nun Tibet betrifft, . . . so glaubte man lange Zeit, dass es nur aus einer Reihe von grossen Plateaux bestände, obwohl bereits Humboldt wiederholt versuchte, diese irrige, aus alten Berichten stammende Ansicht zu wiederlegen. Es giebt zwar einige wenige Plateaux in Tibet, allein sie sind von einer viel geringeren Ausdehnung, als man früher glaubte . . . Die grosse Wasserscheide, welche das Tibetanische Längenthal in zwei Teile trennt, in den östlichen und den westlichen, besteht nicht aus einer Gebirgskette, sondern aus einer allmählichen, die beträchtliche Höhe von 15 400 Fuss erreichenden Anschwellung der sehr breiten Thalsohle . . .»

This view is much sounder and more correct than that which was at the same time accepted in England. Ritter had regarded the Tsang range as a boundary between southern and northern Tibet. Robert von Schlagintweit made the Kara-korum a boundary between Tibet and Turkestan. In this view both were mistaken, as only the Kwen-lun can be regarded as a boundary to Tibet if we regard Tibet as a physical unity. For the political Tibet there is no such boundary to the north.

When he says: »Die Haupt-Wasserscheide Hoch-Asiens bildet nicht, wie man früher irrig glaubte, der Künlün, sondern der Karakorum, eine Thatsache, die wir als die ersten aufgefunden haben», it should again be remembered that THOMSON had delivered a similar proof for the Kara-korum Pass.

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[1] It should, however, be remembered that Dr Thomson had reached the Kara-korum Pass already seven years before the Schlagintweits crossed the system.

Already in a dedication to their great work[1] it had been said: »The mountain systems of the Himálaya, Karakorúm, and Kuenlúen, include the highest elevations of our globe.» Whilst they introduced the English signification High Asia they always only mentioned three principal ranges running through these elevated regions, and the Hindu-kush was the western continuation of the Kara-korum. But there was never a word of a system between Kara-korum and Himalaya, which, in height and extension could be compared with the latter.

Some ten years later a more popular work in four volumes was published by HERMANN VON SCHLAGINTWEIT, in which we get some new glimpses of his views regarding the systems north of the Tsangpo.[2] Here it is not always easy to find in how far the expressed views are the results of their own observations or whether they have been influenced by others. A few quotations will be sufficient.

It had been believed that the northern boundary of the Indian rivers was formed by »Künlün», which at that time had never been reached by any European. But the Schlagintweits were surprised to find that the Kara-korum consisted of ridges even higher than those of the Himalaya. They found that the Kara-korum in reality was the principal range of High Asia and stretched between 95 and 73° E. long. The fact that the Kara-korum is the highest of the three ranges is somewhat hidden by the high position of the snow limit, depending upon the comparatively slight precipitation. To the west the Kara-korum continues in Hindu-kush and Bolor-tagh, that is to say, it divides into two branches. As to the eastern continuation he has the following surprising idea:

»In seiner östlichen Hälfte gabelt sich der Karakorúm (bei 85° ö. L. v. Gr.) in zwei wohl nahezu gleich hohe Zweige; diese begrenzen gegen Norden und gegen Süden eine verhältnismässig nicht sehr bedeutende Depression, deren Richtung der Wasserscheide des Gebirges parallel ist. Die Seen Téngri und Námur liegen in dieser Senkung, welche gegen Osten offen bleibt . . .»

This is mere speculation, for at that time the interior of Tibet was quite unknown, and it is hard to see why he made the Kara-korum branch off into two eastern ranges from 85° E. long. It is, however, interesting to see that Hermann von Schlagintweit believed in an eastern continuation as far as to 95° E. long. The rivers beginning on the Kara-korum and flowing north pierce the Kwen-lun in the same way as do the rivers of the Himalaya running south. Yarkand-darya, Karakash, and Keriya-darya are mentioned as examples. The peaks and ridges of the Kwen-lun are much lower than those of the two other systems. The average height

[1] Results of a scientific mission to India and High Asia, undertaken between the years MDCCCLIV, and MDCCCLVIII, by order of the Court of Directors of the Honourable East India Company, by Hermann, Adolph, and Robert de Schlagintweit. With an Atlas of panoramas, views, and maps. Leipzig and London 1862. This work contains an overwhelming amount of observations, gathered in four big volumes.

[2] Reisen in Indien und Hochasien, Band II: Hochasien. Jena 1871.

of the Kara-korum peaks he regards as somewhat lower than those of the Himalaya, but the average height of ridges and passes is higher.

In spite of Nain Sing's journey he has not changed his view regarding Tibet, a fact that indicates that the Pundit's journey was not sufficient for suspecting the existence of a range between the Kara-korum and the Tsangpo. Thus Tibet remains simply a latitudinal valley bordered by the Dihong and the Indus and by Himalaya and Kara-korum. Kwen-lun is outside of Tibet, and between Kara-korum and Kwen-lun is a plateau with irregular distribution of mountains and valleys.

After having expressed his views regarding the sources of the Dihong, as he calls even the Tsangpo, he continues:[1]

»Die Himálayakammlinie ist hier ungeachtet ihrer bedeutenden Höhe dem Hauptthale sehr nahe liegend; auf der linken, der Karakorúmseite aber muss die wasserscheidende Linie sehr ferne noch liegen; vor der Hauptkette erhebt sich hier noch die Kette des Chomoráng-Gebirges. Der grösste Theil der Chomorang-Kette gehört zu Gnári Khôrsum. Sie beginnt im Westen in der Provinz von Pangkong. Als mächtige Kette trat das Chomorang-Gebirge sehr deutlich in den Umgebungen von Gártok hervor; es ist auch als Mittelkette von Gnari Khorsum mit seiner etwas isolirt stehenden Fortsetzung in Ost-Tibet auf unserer Routen-Karte von 1861 angebracht. Der Name wurde erst durch die Pundits bekannt.»

Even here, in a work published seven years after Nain Sing's journey along the Tsangpo, Schlagintweit speaks of the left, Kara-korum-side of the main valley. He knows Hodgson's works for he quotes him elsewhere. But he has nothing to say of his Nien-chen-tang-la. And still we easily find on his map of 1861[2] an unmistakable revival, at least partly, of Hodgson's range. The Kara-korum range runs diagonally through the whole interior of Tibet. From the Kara-korum pass it runs S.E., south of the Ike Namur-nor, which is, by the way, represented as the source of Keriya-darya, an invention made entirely by Schlagintweit himself, for there is nothing in the original Chinese map, that justifies such an arrangement. But he is no doubt right in drawing the northern Kara-korum south-eastwards. But how could he know? Nobody had ever been there. It is only conjecture that happens to be right.

Then, suddenly the system turns to the east, S.E., south and finally east again. From where has he got this sharp bend, and how can he know that a part of the Kara-korum, in the very unknown heart of Tibet, is meridional? In the eastern part of the range, which runs west and east, we recognize a bastard between the maps of d'Anville and Hodgson. Or rather, the rivers are d'Anville's, the range Hodgson's. From this we also understand why Schlagintweit has nothing to say of the Transhimalaya. For he makes the Kara-korum turn southwards and run between the Tengri-nor and the Tsangpo. He suspects two systems, but he combines them.

[1] Op. cit. Band III: Hochasien, II Tibet; zwischen der Himálaya — und der Karakorúm-Kette. Jena 1872, p. 26.
[2] Pl. XIX.

ROUTES

taken by

HERMANN, ADOLPHE, AND ROBERT DE SCHLAGINTWEIT

and their Assistants and Establishments

in

INDIA AND HIGH ASIA

from 1854 to 1858.

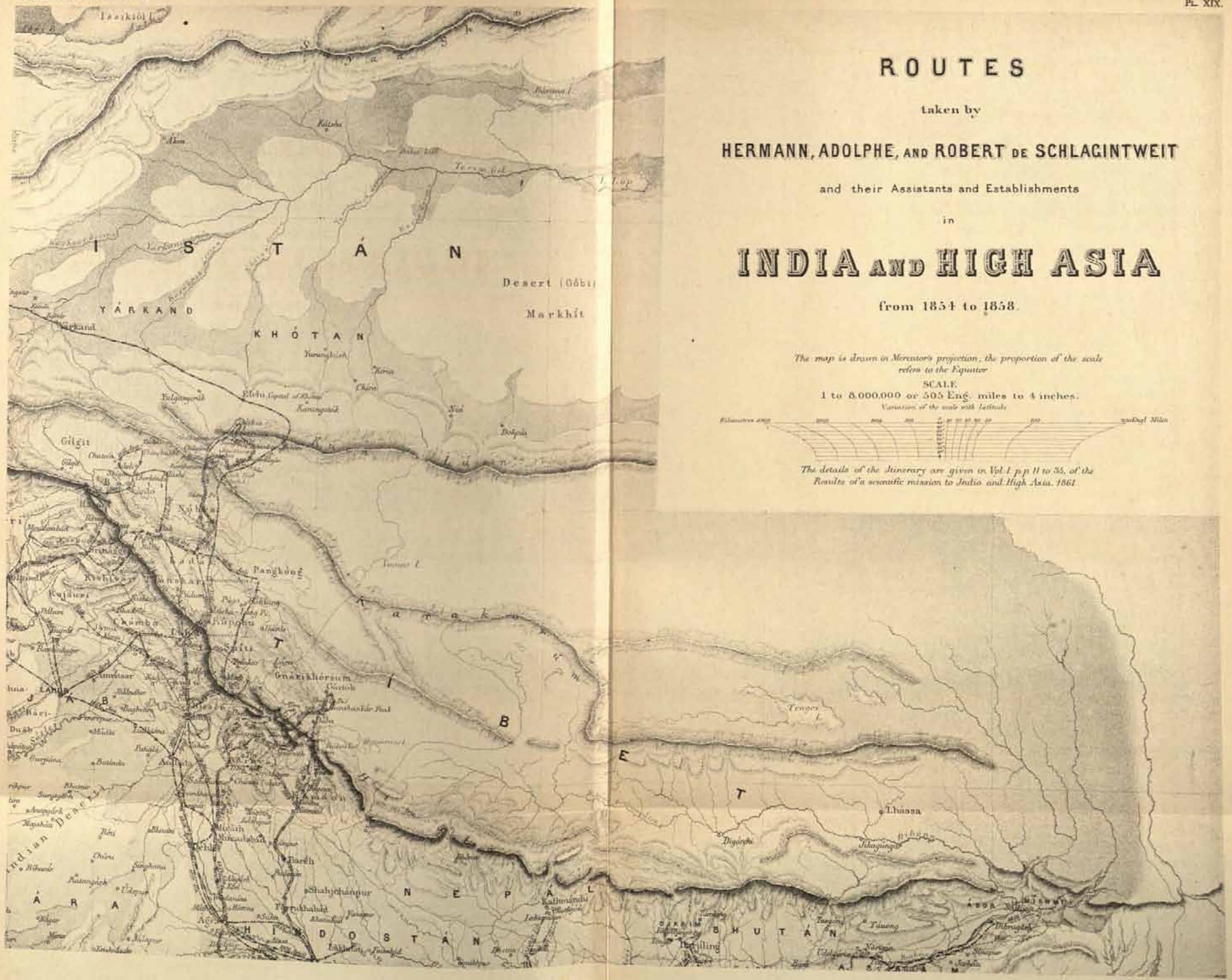
The map is drawn in Mercator's projection, the proportion of the scale refers to the Equator

SCALE

1 to 8.000.000 or 505 Eng. miles to 4 inches.

Variation of the scale with latitude

The details of the Itinerary are given in Vol. I. p.p. 11 to 35. of the Results of a scientific mission to India and High Asia. 1861



The mountains north of the Tsangpo according to the brothers Schlagintweit, 1861.

Gen. Stab. Lit. Anst. Stockholm

The western half is Kara-korum, the eastern Transhimalaya. However, he does not lose sight altogether of the two missing halves, or the real eastern Kara-korum and western Transhimalaya. But they have dwindled on his map to secondary ranges.

That this is really his meaning is clear from the Index map of his Atlas, where he only knows three »principal mountain chains of High Asia», and where the direct eastern continuation of Kara-korum and the direct western continuation of the Transhimalaya are called: »some of the secondary chains of High Asia».

This map was drawn a few years before Nain Sing's journey. But it is curious that the discoveries of Moorcroft and the Stracheys, with whose works Schlagintweit was familiar, have not in the least improved his extraordinary representation of the western Transhimalaya. Not even the Kailas is marked, although, in those days, it was believed to be situated on the range, which Cunningham called the Kailas or Gangri Range.

Schlagintweit's views do not seem to have found many followers, unless we should suspect some little influence from him on the Tibetan map in *Stieler's Hand-Atlas* for 1875. He has not contributed to the knowledge of our system. He has only complicated it a little more. The characteristic feature of his standpoint is that the northern tributaries of the Tsangpo should rise from the southern slopes of the Kara-korum, and that some of the rivers from its northern slopes went to Eastern Turkestan.

CHRISTIAN LASSEN has given a wonderful and excellent *résumé* of the history of geographical knowledge about India and its neighbours.[1] He keeps, regarding the modern geography, of course the general standpoint of his time, but in many respects he is more perspicacious than even professional geographers. He regards the Kwen-lun system or Kulkun, which from Kokonor stretches to the west and through the Tsungling is connected with the Belur-tagh and Hindu-kush, as the sharp natural boundary between the northern tribes and the Tibetans. But in a note he adds that perhaps it would be more correct to say that such a boundary were formed by the Gang-disri and Dzang-mountains, for north of these ranges the Khor or Mongols live. We remember from where this view originally dates, and in connection with these ranges Lassen has no new opinion of his own.

The situation and importance of the Gangdisri range he explains in these words:

»Der Kailâsa, Gangdisri der Tibeter, ist eine aussere Kette und gehört nicht dem eigentlichen Himâlaya; er ist eine der höchsten Erhebungen der Erde, aber noch ungemessen; er ist ein Ausläufer des Karakorum-Gebirges, welches vom Tsungling, wo dieser in den Kuenlun übergeht, sich abzweigt, und S.S.O. nach den heiligen Seen hinstreicht; durch den Kailâsa schart es sich dem Himâlaya an, selbst verbindet es das Quellgebiet Pamer und die Gegend des Sees Sirikul mit dem eben bezeichneten Quellgebiete der Indischen Flüsse und den heiligen Seen. Das Karakorum-Gebirge umwallt das obere Industhal von der rechten Seite, dem Flusse parallel . . . In der Senkung zwischen dem Karakorum und Himâlaya liegen am Indus die zwei

[1] Indische Alterthumskunde, Leipzig 1867, I, p. 16 et seq.

westlichen Tibet; das mittlere mit der Hauptsadt Ladakh oder Leh, das westliche oder Kleintibet oder Baltistan mit der Hauptstadt Iskardu; das eigentliche oder Grosstibet liegt ostwärts zu beiden Seiten des Dzangbo. Alle Tibeter heissen bei den Indern Bhôta.»

Characteristic for this view is the uninterrupted continuity of one great range. He regards the Kailâsa or Gangdisri range as a ramification from the Kara-korum, which, itself, is only a branch from the Tsungling, branching off at the place where the Tsungling and Kwen-lun are connected. At Kailas it comes in intimate contact with Himalaya without belonging to that system. According to Lassen's description the great range, »one of the highest on the earth», forms a kind of connection between Pamir and the source-region of the great Indian rivers. In this construction the individuality of the different mountain systems gets lost, and so does also the parallelism between the different tectonic folds. Like Schlagintweit, Lassen regards the Kara-korum and the Himalaya as the boundaries of Tibet. In this respect he comes in some contradiction to himself. For, as quoted above, he suggests that it may be more correct to make the Gangdisri and Dsang-mountains a boundary between the Tibetans and the Mongol tribes to the north. He must have connected the map of Tibet in *Stieler's Hand-Atlas*, which by that time showed the Khara-korum-Chor Kette north of the Zzang Kette. Thus, if Tibet is situated between Kara-korum and Himalaya, the Dzang range (Transhimalaya) cannot be a northern boundary of the Tibetans. Like the geographers of the preceding decades Lassen felt sure of the existence of a range north of the Tsangpo. But nothing was known of its central parts, and therefore it was not easy to explain the geography, nor the ethnological boundaries.

Further Lassen says:

»Die Gränzen des Indischen Gebiets am obern Indus lassen sich wegen unserer geringen Bekanntschaft mit dem Lande nur im Allgemeinen bestimmen; es werden auch hier die äussersten Ketten sein; der Darda Himâlaya im Norden Kashmirs bis an den Indus, auf dessen rechtem Ufer aber die Gränze unklar ist. Doch wird man wie die Gebiete von Iskardu und Ladakh oder sogar Lhassa mit Recht als Indisch bezeichnen dürfen, wie geschehen ist; denn wenn eine höhere Kette als der Himâlaya diese Länder von dem Norden trennen sollte, so bleibt der grosse Gegensatz, dass die Länder der Bhôta Plateau-Länder sind, Indien aber, wo es anfängt, sich schnell zur Ebene herabsenkt und seiner Hauptsache nach Niederung ist; der Himalaya bildet den äussersten Südrand des Hochlandes und scheidet dieses von dem ganz verschiedenen südlichen Lande, während die inneren Ketten Hochasiens nur verwandte Gebiete von einander trennen. Der Monsun übersteigt nirgends den Himâlaya, es fehlt daher auf dem Hochlande die Regulirung des Klimas und der Jahreszeiten, welche eine Wirkung des Monsuns ist, und schon dieses macht den Himâlaya zur entschiedenen Naturgränze.»

In this passage as well we feel the uncertainty, but possibility, of a higher range in the north. So from Lassen's works our problem has not got any assistance and nobody could expect it either. But it is interesting to see how one of the greatest scholars of his time tried to make the best possible use of the geographical material existing to explain his ethnological and religious boundaries. What he says

of the monsoon is also in accordance with the general view of the time. As a matter of fact the influence of the monsoon is felt much further north of the Himalaya than formerly believed.

From FREDERIC DREW's excellent work I must, for the sake of completeness, insert a few quotations.[1] He discusses in a most able way some of the geological questions regarding the western parts of our system:

»Cunningham, in his book on Ladakh, speaks of the 'Kailas Range' as extending in one unbroken chain from the source of the Indus to the junction of the Shayok, the name being taken from a peak on it near Mansarawar Lake, and he calls the great ridge behind Leh, between the Indus and the Shayok, by the same name, 'Kailas or Gangri Range'. It will be seen that I have not used this name in my map nor elsewhere; in this I follow Col. H. Strachey, who does not connect by its name this last ridge (which I have called 'Leh Range', though on the maps I have put no name to it) with any of the chains to the east or south-east of the part we have now reached . . . We are now (at Dora) where the unbroken continuation of the Leh Range ceases. That long line of granite mountain, which began at the Indus and Shayok junction, and has, up to here, extended from north-west to south-east for 220 miles, in that direction ends, and the Indus Valley occurs. Immediately beyond the river, between the Indus and the Hanle stream, occur again granite mountains, which, geologically, are a continuation of the others, and indeed lie in the same line with them. So that it would not be alien to the methods of geological description to say, that the Indus here cuts through the granite range; the range being taken to extend from the Indus and Shayok junction to the neighbourhood of Hanle at all events — how much farther to the south-east I know not. Now to the north-east of all this is a distinct line of mountain, of which Sajum Station, 20 021 feet, is one of the summits; this, according to Cunningham, would be part of the Kailas Range; here this range also is of granite, though farther east its composition changes; the line of it runs north-westward, overlapping the line of the Leh Range; the granite of the two ranges is in part continuous and in part separated, as regards the surface, by some shale and limestone; in the line of the occurrence of these last rocks is the depression separating the two ridges; the highest part of this depression is the Tsaka Pass, about 1 200 feet above the Indus Valley, but nearly 5 000 feet below the hill summits, on either side; the rise to this is a gentle ascent of 3°; the Pass divides the Upper Indus Valley from the Pangkong drainage-basin. According to General Cunningham's nomenclature this Pass is a depression in the Kailas Range. According to the plan of description just followed by me the Tsaka Pass is a neck connecting two ridges, the Leh Range on the south-west and this other on the north-east . . . About NE from Dora the northern mountain-ridge changes in point of composition from granite to a more or less altered shale; the line of it is continued more to the east than before, while in the line of its original direction are some more hills which are joined to the other ridge by a neck called on the survey map 'Chang Pass'; this Pass is practically the boundary of Chinese Tibet in that direction; in the Indus Valley the boundary will be a day or two's march beyond Dora.«

The Leh Range of which Drew said he did not know how far it proceeded to the east, is the same which Burrard calls the Ladak range and continues the whole way to the Dihang bend of the Brahmaputra.

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[1] The Jummoo und Kashmir Territories. A geographical account. London 1875, p. 312 et seq.

Cunningham must be pardoned for extending the name Kailas or Gangri to a wrong range. HENRY STRACHEY had not made the same mistake. In this connection it may be interesting to remember what Henry Strachey has to say of the real Gangri range, — not the wrong one as in Cunningham's case.

Strachey had not much occasion to come into contact with our system, but he got some glimpses of it from the lakes. From his first camp, north of the pass Lánkpya Dhúra he could see »through the opening northward a glimpse of distant blue mountains, part of the Gángri range perhaps, on the north side of the Sutlej».[1] From Láma Choktan he makes the following observation: »The north-western horizon is bounded by the Gángri range of mountains moderately tipped with snow (2nd October), and remarkable for the deep purple-blue color of their inferior rocky parts; and about the middle of this range rises the snow-capped Peak of Kailás, somewhat higher than the rest of the line. I do not believe these mountains are nearly so lofty as the main ranges of the Indian Himálaya.» From Rakas-tal he could see the outlet valley running westwards as far as his eye reached and the Gangri mountains he saw stretching north-westward for some 30 miles. »The Gángri range continued also far to the eastward, rising out of a wide green plain, which extended between the base of the mountains . . .» He gives a good description of the Kailas as he saw it from afar, and makes it 21 000 feet high. »The openings on both sides of Kailás disclose only more mountains in the rear . . .» As he suspected, and even saw other mountains in the north-east, the view he further on expresses is the more curious. For he says:[2]

»The Gángri range of mountains subsides at Tankcham-Tarjum the next east from Sámo-tókchim. Hor Tol is Jang-tang, i. e., untilled pasture ground, and belongs to the province of Gnari, subject to the Garpun of Gartokh. Beyond Hor Tol, eastward, lies the district of Tosher, by some pronounced Doshel, also Jang-tang; it is subject to the Zungpun of Sáku Zúng, or Sáka, which is the centre of the province next east of Gnari . . . The Gangri mountains subside about Maryum La; probably the La itself is a terminating spur of the Gangri range; beyond that, eastward, extends table-land with smaller, more irregular and detached hills, all the way to Lhassa, and as far as informant knows to the northward.»

Thus Strachey regarded the Maryum-la as the eastern boundary pillar of the Gangri range, instead of its being a transverse threshold in a longitudinal valley or a connecting link between two mountain systems. His informant alone is responsible for the table-land with small detached hills all the way to Lhasa and so far northwards as was known, — instead of one of the most compact mountain systems in the world. Strachey's informant had certainly travelled in the Tsangpo valley, from where one really can get the impression of a high and steep edge of a table-land

[1] Narrative of a Journey to Cho Lagan etc. — in September and October 1846. Journal Asiatic Society of Bengal, Vol. XVII, Part II, 1848, p. 140.
[2] Ibidem, p. 327, 328 and 330.

stretching northward. To a certain extent it was represented as such on the map of the Tibet Frontier Commission, with several mighty peaks on the very edge, peaks which together formed a border range. This view of Strachey's was, however, not at all in accordance with the maps of Klaproth, Ritter and Humboldt, nor did it impress Hodgson in the least. It is not easy to say who was least wrong, those fighting for *one* gigantic range, or Strachey's informant speaking of a plateau-land with detached, irregular hills. This last description seemed to be confirmed by Nain Sing.

A name that will occupy our attention later on appears already in this article of H. Strachey. Giving the names of the 13 chief districts of Gnari, he mentions amongst them Bongba (or Bongbwa) Tal, north of the Gnari mountains, consisting of two divisions, viz. Bong-meth, that is lower, and Bong-toth, that is upper Bong, the two districts being under separate Puns. The district Bongthol we find on the map of the Pundits at the upper Singi-kamba or Indus. The real great province of Bongba is situated further east.[1]

H. Strachey on his map (Vol. II, Pl. XI) to this paper shows the Tise or Kailas as not rising on the very range of »Gangri Mountains», but from a spur south of the range.

A few years later H. Strachey wrote of the supposed Maryum range: »Nari-Mangyul is separated from Nari-Khorsum by a natural landmark, viz. a transverse mountain ridge running from the N. face of the Indian watershed, more or less to the N, across the breadth of the central upland, and itself constituting a great watershed that divides all Nari and Utsang into two main basins of drainage. The major axes of both these lie parallel to the longer direction of the table-land, till they attain the further extremities of Bod and Nari respectively, where they become deeply sunk, and turn rather abruptly through the Himalaya to enter the plains of India.»[2] It has been proved above that this view cannot be said to be correct.

One or two extracts from Richard Strachey may be of interest. Concerning the passage into Tibet from Kumáon or Garhwál, he is struck by the sharp contrast and sudden change of relief: »After weeks have been spent in traversing mountain after mountain, of the seeming interminable succession of which the eye begins to tire, while the incessant roar of the torrents that rush by begins to weary the ear, we are here suddenly arrested by seeing spread out before us a plain, that without sign of water, of vegetation, or of animal life, stretches away, as far as the eye can reach, in a north-westerly direction; behind which rise mountains that gradually fade away in the distance, with here and there only a peak lightly tipped with snow.»[3]

He points out that even from the time of the earliest missionary travellers in

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[1] At another place H. Strachey speaks of »Bongba, or Little Bong, a political or geographical connection of the great Bong-Madma, on the N.E.» Journal Royal Geogr. Society, Vol. 23, 1853, p. 13.

[2] Journal Royal Geogr. Society, Vol. 23, 1853, p. 8.

[3] Journal Royal Geographical Society, Vol. 21, 1851, p. 62.

Tibet we obtained the idea of a vast plain, whereas subsequent travellers showed it to be a confused mass of mountain.

Speaking of the plain immediately to the north of the British Himalayan provinces, he says: »The mountains that bound it to the N, hardly appear to be what we should call snowy, and they are by no means so high as the ranges of the Himalaya on its southern edge.» He gives Kailás 22 000 feet and another peak west of it 20,500 feet. The mountains he is speaking of as situated immediately north of the Himalaya are our Transhimalaya; this system can of course never be compared with the Himalaya in respect to abundance in snow. But still there are several high parts of the Transhimalaya, with much snow and glaciers; f. i. Nien-chen-tang-la, Targo-gangri, Kailas and several of the ranges I discovered in the central parts of the system.

From the same period dates the description of *Tibet and Sefan*[1] by Dr. CH. GUTZLAFF. All he can tell of our system is included in the following passage: »In the eastern parts of Tibet the mountains run S, with extensive plains and valleys between them, especially along the banks of the Dsangbo. The Nomkhoun-oubashe chain is N of L'hassa; the Langbo is to the N, and the Chour-moo-tsangla chain to the SE of Chasha-lo-umboo. The Kentaisse range to the W is important. One very prominent peak in Ari (the Tese or Kailassa in Sanscrit), celebrated also in Hindoo mythology, and near which are the sources of the most celebrated rivers, lies in the 80° E long., and 34° N lat.» Here Kentaisse is regarded as a range. Nomkhoun-oubashe is taken from Humboldt's map, where, in reality, it is identical with the Nien-chen-tang-la.

In MALTE-BRUN's geography, edition of 1860, we read: »On voit s'étendre de l'ouest à l'est, dans l'intérieur du Tibet, vers la partie occidentale, les monts Gangdisri ou Kaïlas, et, vers la partie septentrionale, les monts Tant-la.»[2]

[1] Journal Royal Geographical Society, Vol. 20, 1851, p. 191 et seq.
[2] Géographie universelle de Malte-Brun, revue par E. Cortambert, Paris 1860, p. 224.

CHAPTER XXI.

MARKHAM AND SAUNDERS.

We have now followed the development of knowledge of the Transhimalaya through the ages and seen how extremely slowly its peripheric parts have emerged from darkness, and how, as a very natural matter of fact, its interior parts have remained a *terra incognita*. We are now approaching the last period of its history. Between 1875 and 1877 two well-known scholars have more particularly discussed the system, and in this chapter with the assistance of some quotations, I will show their views.

At that time Sir CLEMENTS MARKHAM was, no doubt, the great authority on the geography of Tibet. His publication of the early British journeys to Shigatse and Lhasa gave him an occasion to enter thoroughly into the matter. And since then he has always followed Tibetan exploration most attentively. The journey of the native explorer to Tengri-nor brought some of the great problems again into the foreground.

Still in 1875 Markham says that Great Tibet is one of the least known and most important regions which remain to be explored.[1] It is, he says, to Montgomerie we owe all our recent knowledge. Our general knowledge of the country is still derived from the work of du Halde and from the old maps of d'Anville. Markham also mentions Hodgson amongst the authorities, and in giving the boundaries of Utsang he says: . . . »and on the north (it is bounded) by another lofty range called by Hodgson the Nyenchhen-thánglá chain, which separates the country of villages and cultivation from the nomadic hordes on the still loftier plateau of lacustrine drainage between that chain and the Kuen-lun.» And further: »The Tsampu, or Brahmaputra, traverses the whole region from west to east, and receives tributaries from the Nyenchhen-thánglá Range on the north, and the northern slopes of the Himalayan outer and inner chains on the south.» It is surprising to see how Hodgson, so late as in 1909, was still regarded as an original authority upon the Nien-chen-tang-la although all the knowledge existing about that range originally came from Klaproth.

[1] »Travels in Great Tibet and Trade between Tibet and Bengal.» Journal Royal Geogr. Society, Vol. 45, 1875, p. 299 et seq.

Speaking of »the third explorer», the young Tibetan of 1871, Markham says:[1] »The explorer advanced north from Namling with the intention of crossing the range, called by Hodgson the Ninjin-thanglá, and of exploring the great Namcho Lake — the Tengri-nor of d'Anville and the Chinese surveyors. The range was crossed by the Khalamba-la Pass, 17 200, on the 8th of Jan. 1872.» Speaking of the results of the three native surveyors Markham mentions »the exact geographical knowledge they have furnished us with respecting . . . the great chain forming the northern boundary of the basin of the Upper Brahmaputra».

He has used the term *range* several times and finally calls the Nien-chen-tang-la a *chain*. Thus he does not seem to make any difference between a range and a chain. I do not know whether the two significations were specified in the English geographical terminology of 1875. Even FREDERIC DREW who wrote in this very year does not make the difference clear; he says: »the quotation whether two certain lines of mountain should or should not be counted to belong to the same chain or range must depend on the definition you give to the words 'chain' and 'range'. It is conceivable that the definition might be different in the mouths of the biologist, the meteorologist, the geologist, and the pure geographer. In any case it would only be a difference of terms. I myself have been and am using the word in the most restricted sense, as merely descriptive of the most patent facts.» At any rate he does not seem to include any morphological distinctions in the two terms. With Markham the case is the same. So at this period the mountains north of the Tsangpo were still regarded as a chain, as they had been ever since Klaproth, Ritter and Humboldt. Only d'Anville had been right in representing a great number of ranges, that is to say, a mountain system. But d'Anville was not taken seriously. His map more and more lost its importance and was regarded as a mere object of curiosity.

The terms range and chain, and many other important matters, were discussed in the following years, specially on account of a critical article: *Trans-Himálayan Missions and their Results.*[2] The anonymous reviewer seems to have been led chiefly by political motives against Markham's proposal to open up trade and intercourse with Tibet. In his *Geographical Magazine* Markham wrote a very able and clever reply which is especially interesting to us, as it gives an idea of the general geographical knowledge of the two systems: Himalaya and Transhimalaya as compared with each other.[3]

Markham here proves that Captain HERBERT, in 1818, from his experiences between the Kali and the Satlej, was the first geographer who attempted to give a general view of the orography of the Himalaya. Herbert was also the first to observe that the line of water-parting was not always synonymous with the line of

[1] Ibidem p. 310.
[2] Calcutta Review, Vol. LXIV, January 1877, p. 115 et seq.
[3] »The Himalayan System». The Geographical Magazine, Vol. IV. 1877, p. 113 et seq.

greatest elevation. »He traced a connected line of peaks, not under 21 000 feet in height, and intersecting the watercourses, and concluded that they did not form a range of mountains because rivers broke through them. This erroneous notion of the essential character of a range of mountains explains his misconception of the Himálayan system. A cordillera, or range of mountains, is a ridge of elevated land running in one general direction, and the fact of its being cut through by one or more rivers does not alter its character and convert it into a series of spurs or ramifications. It still remains a range of mountains, and any other conception of it would give a most erroneous idea of its physical character. The theory that when a chain of mountains is cut through by rivers it becomes a series of spurs was thus originated by Captain Herbert, and may be called the Herbert theory. It was adopted by Dr. Thomson, Mr. Brian Hodgson, and Dr. Hooker.» Hooker used the rivers as guides. »He proposes to call Herbert's Indo-Gangetic the Cis-Sutlej, and the chain commencing at Kailas the Trans-Sutlej Range.» Hodgson »describes the Nepal division of the system as consisting of three river basins, those of the Karnali, Gandak, and Kosi, separated by peaked ridges parallel to each other, and at right angles with the main chain. Hooker adopted the same view.»

Then he comes over to Cunningham, whose Mid-Himálaya and Great-Himálaya would be the Cis-Sutlej and Trans-Sutlej ranges of Thomson, and the former would be the Indo-Gangetic range of Herbert.

Next comes Henry Strachey who considers the general plan of the mountain system to be a series of parallel ranges running in an oblique line to the general extension of the whole, the great peaks being generally on terminal butt-ends of the primary ranges. The chief watersheds often follow the lowest of the ridges, whereas the channels of drainage cross the highest.

Finally he comes to Saunders' view as set forth in his memoir: »The Indus, Sutlej, and Sanpu form a continuous trough in the same axial direction, and divide the Northern Himálaya from the Karakorum and Gang-dis-ri Mountains. The Kara-korum divides the Indus basin from the basin of Lake Lob, and the Gang-dis-ri separates the Indus, Sutlej, and Sanpu from the elevated plateau of Tibet, which is drained by inland lakes. This general view is clear and perspicuous, and is made more so by the excellent map which accompanies Mr. Saunders' memoir.»

Markham, as in his book on Bogle's mission »treated of three main ranges, considering the Karakorum and Gang-dis-ri as the Northern; Mr. Saunders' Northern Range as the Central Himalaya; and the other the Southern . . . The Northern Range is divided into a western and an eastern section. The western is known as the Karakorum Range . . . The sources of three great rivers are on the southern slopes of the Northern Range, and force their way through the Central and Southern Ranges, namely, the Indus, Sutlej, and Brahmaputra. The eastern section of the Northern Range separates the inland system of lakes on the Tibetan plateau

from the valley of the Sanpu or Brahmaputra. It is sometimes known as the Nyen-chhen-tang-la mountains, and Mr. Saunders proposes that it should be called the Gang-dis-ri Range. Parallel to the Northern Range runs the Central Range of the Himálaya, the two enclosing the upper basins of the Indus, Sutlej, and Brahmaputra. — In noticing the Herbert theory, according to which the Southern Range is not a cordillera, because it is broken by the defiles through which the rivers force their way, which rise in the Central Range, I pointed out that this is not a question of fact, but of correct definition. If a cordillera is a range of mountains through which rivers force their way, as well as one which has an unbroken water-parting, then the Southern Range of the Himalaya is undoubtedly a cordillera or chain of mountains. — The Calcutta Reviewer fancies that he settles the question by saying that a row of unconnected links does not constitute a chain, and that the essence of a chain is the continuous connection of its links.»

In opposition to this view Markham maintains that a cordillera is a range, or ranges of hills, continuing one after another in a direct line, whether broken through by ravines or not. And he adds: »The notion that a chain of mountains must culminate in a continuous water-parting is a fallacy. A great mountain system does, but it usually consists of two or three distinct cordilleras or chains, and some of them are, as a rule, cut through by river courses, though each, also, forms a distinct water-parting of its own. We have seen that this is the case in the Himalayan system, in which the Central and Southern Ranges are both cut through by rivers, though the Northern Range is not.»

Between the valley of the Vilcamayu and the basin of Titicaca in the Andes he finds a counterpart of Maryum-la, dividing the basin of the Satlej from the valley of the Brahmaputra. He also finds a geographical homology between the elevated valleys of the Andes and those between the Northern and Central Ranges of the Himálaya, or Transhimalaya and Himalaya.

He gives the following definition of a water-parting: »In English geography a water-parting, called a divide by the Americans, is the ridge which separates the flow of water on either side of a range of hills. The water-shed is not the water-parting, or dividing ridge, but the slope down which the water flows from the ridge to the river in the valley below.»

Markham sums up his views in the following cardinal points: »The Southern Himaláyan Range is clearly defined by its numerous snowy peaks, which are the loftiest in the world. Behind it is the Central Himálayan Range; and the system is completed by the Karakorum and Gang-dis-ri Mountains, which I have called the Northern Range.»

In this article of Markham's we find for the first time, if not a *résumé* of the history of its exploration, so at least an attempt to fix the orographical situation and importance of the mountain system north of the Tsangpo. He calls it the Northern range, as compared with the two Himalayan ranges. It could as well be called

the Southern range if compared with Arka-tagh and the principal or northern Kara-korum system. The Northern Range, however, is composed of the Kara-korum and the Gang-dis-ri. Markham thus regards the Gang-dis-ri, Hodgson's Nyenchhen-thánglá, as a direct continuation of the Kara-korum, a view which originated from Hodgson and had no ground whatever in facts. If such a question as this: is the Trans-himalayan system a direct continuation of the Kara-korum or not? should be put to all living geographers, not one of them would even now be able to answer. In 1877 it was easier, for then mere theories were used as proofs, and as next to nothing was really known, except the sporadic discoveries of the Pundits, one had a feeling of liberty to arrange the great features of orography in the way that seemed to everybody to be the most likely.

Markham also states as a positive fact that the sources of the Indus, Satlej and Brahmaputra are situated on the southern slopes of the Northern Range. The real sources of the Satlej and Brahmaputra are, as we have seen, situated on the northern slopes of the Himalaya, although many sources of northern tributaries come from the southern slopes of the Transhimalaya. The sources of the Indus are situated between different ranges belonging to the Transhimalaya. This conclusion could have been drawn even from the material existing in 1877, as ten years earlier some of the more or less parallel ranges had been crossed by Pundits. But Markham regarded the Transhimalayan system as one definite range, and as its water-parting followed its crest the Indus could not possibly originate from its northern side. The possibility of several ranges, some of which could be pierced by the river, was forgotten.

We cannot leave Markham without noting the Calcutta Reviewer's opinion regarding the three ranges. He suggests the phrase »Indo-Tibetan system» for the mountainous tract which Markham designates Himalayan and as inner and outer are words which are likely to lead to confusion, he recommends that they be abandoned altogether. If there were three chains, the appropriate terms for them would clearly be Northern, Southern and Central. He continues: »We had thought that this theory of three chains had long ago been exploded by Mr. Brian Hodgson and other great authorities who have the advantage over Mr. Markham of having studied the question on the spot, and who maintain that the so-called southern chain, being occasionally intersected by rivers of more remote origin, is not a chain at all, but a series of spurs running south-wards from an extended line of elevation more to the north . . . . — The line of the main watershed on the north, the general direction of which agrees with Mr. Markham's northern chain of Kara-korum and Nyenchen-thangla mountains, may be traced by the following passes, uplands, &c., from the north-west corner of the Tagdumbash Pamir:» — amongst the passes which he enumerates are: Mintaka, Kalik, Mustagh, Karakorum, Dapsang, Changlungbarma. Chumik, Lakmo, Chomorong, and Khalamba-la.[1]

[1] Op. cit., p. 145, 147.

If Markham had not studied the question on the spot, we have seen above that Hodgson has not either done so. Even some years before »The Calcutta Reviewer» WILFRED L. HEELEY deals with the country north of Himalaya in a way which proves that he has more confidence in Nain Sing than in Hodgson. He says: »Hills are always in sight, generally in low ranges parallel to the river, but often rising into snowy peaks. From the source of the Brahmaputra a long range bearing numerous glaciers stretches 150 miles to the east. North of the river there is, generally speaking, an open country intersected by immense tributary rivers, and without cultivation of any kind.» Further on he says that north of the Yaro Tsangpo is a »wild wide country, tenanted by nomads».[1]

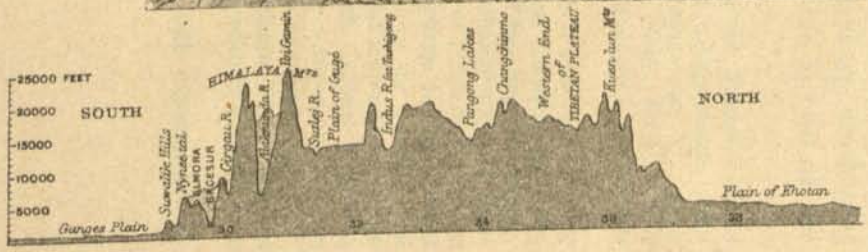
However, Markham's orography was widely accepted, and was introduced even into such an important work as *A Manuel of the Geology of India*,[2] where, in 1893, it is said: »The most popular of the views regarding the physical geography of the Himalayas is probably that proposed by Clements Markham, which regards them as consisting of three more or less parallel ranges known as the northern, central, and southern, respectively. This view was most beautifully illustrated in the map attached to his edition of the travels of Bogle and Manning, where three long ranges are depicted, stretching across the map from east to west. The view appears to have a certain resemblance to the truth, and cannot be absolutely disproved owing to our ignorance of the geography of the greater part of the Himálayas and to the indefiniteness of the term mountain range, but our knowledge of Himálayan geography is sufficient to show that the orography of the Himálayas is by no means so simple or well defined as it is represented on the map just referred to.»

OLDHAM is of course quite right in dealing with Saunders' map in Markham's book in this critical way. Brian Hodgson's Nyenchhen-thánglá was of no use to him, and he does not even mention it.[3] The north-western portion of the mountain system in question is the best known, and consists, according to Oldham, of four ranges: Mustagh or Karakorum, the Ladákh range, the Zanskar range and the Pir Panjál. He very wisely adds: »Nothing definite can be said of the south-easterly continuation of the ranges.» But the Ladákh and Kara-korum ranges may be regarded as coalescent to continue in the range of mountains which runs north of the great longitudinal valley, of the upper Indus, Sutlej, and Sanpo rivers. »It may, however, well be doubted whether either of these ranges has a real continuity along the whole length of the Himálayas, and it is altogether more probable that, whether we regard them structurally or according to the accidents of the existing contour of

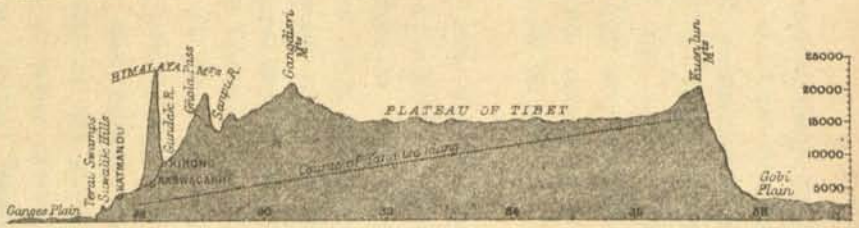
[1] The Calcutta Review, Vol. LIX, Calcutta 1874, p. 139 et seq.

[2] By Medlicott and W. T. Blanford, Second edition: R. D. Oldham, Calcutta 1893, p. 460.

[3] HANS LULLIES is right in saying: »Das Motto der Ritterschsn Erdkunde: 'citius emergit veritas ex errore quam ex confusione', könnte wohl kaum der Darstellung eines andern Erdraumes passender vorangestellt werden, als der Beschreibung des chinesisch-tibetanischen Grenzgebietes, und kaum anders- wo hat der Glaube an falsche Autoritäten Hydrographie und Orographie in gleicher Weise entstellt und verwirrt.» Das chinesisch-tibetanische Grenzgebiet . . . 1880.



Section of the Himalaya Mts and Tibet between Longitude 79° & 80°



Section of the Himalaya Mts and Tibet about Longitude 85°

A Sketch of the Mountains and River Basins of India, by Tr. Saunders, 1870.

Gen. Stab. Lit. Anst. Stockh.

the ground, they consist of a series of comparatively short ranges overlapping each other at their extremities. — Though it is impossible to give any definite idea of the detailed orography of the Himálayas it is possible to divide the mountains into orographical regions sufficiently distinct from each other, even if their exact boundaries are somewhat indefinite. The innermost of these is the upland of Tibet, characterised by great elevation and a dry climate . . .» The orographical region, which in fact is identical with the Transhimalaya, is therefore, according to Oldham, a very high and dry upland, and hardly anything else could be said of it in 1893.[1]

The name of TRELAWNY SAUNDERS is intimately associated with the history of speculative exploration on the Transhimalaya. To give an idea of his position and views it is sufficient to refer to two different papers of his, published in 1870 and 1877 resp. In the first[2] he represents on his maps the great peaks »as a culminating outer range, separated by a chain of elevated valleys from an inner range which forms the water-parting between the basins of the Ganges and Sanpu-Bramaputra.»

Within this double range of the Himalaya he distinguishes the following parts: 1) The great trough of the Tsangpo, the Satlej and the Indus. 2) The high uninhabited plain of Tibet, which is, 3), »succeeded on the east by a part of the highland, cut up by vast gorges and narrow ranges, watered by great and rapid rivers, of which the Sanpu is the most westerly, and the Yalung, an affluent of the Yang-tse, is the most easterly. In these maps the basin of the Sanpu is made conterminous with that of the Yang-tse, but some would carry the three distinct basins of the Irawaddy, the Salween, and the Mekong or Cambodia rivers up northward into the narrow space between the Sanpu and the Yang-tse. This is one of the

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[1] Dr. H. Lullies (op. cit. p. 34, 41) expresses the following opinion of the Transhimalayan mountains: »Die südwestliche Fortsetzung dieses Gebirges (Tant-la) ist ebenfalls nachgewiesen, denn östlich des Tengri-nor überschritten die Panditen von 1872 und 1875 eine gewaltige von NO. nach SW. sich hinziehende Schneekette, auf der sich der Nin-tschin-tangla zu 7 193 m erhob. Oestlich sind diesem Gebirgszuge, welchem Richthofen den Namen Tangla giebt, jedenfalls noch einige Parallelketten vorgelagert.

Auch die Ansicht Markham's, welche Saunders auf der Karte 'The Himalaya and Tibet' in sehr charakteristischer Weise zum Ausdruck gebracht hat, dass das tibetanische Plateau nämlich im Osten auch von einem Walle, gleich dem Himalaya im Süden, in ebenso scharfer Weise begrenzt werde, und dass dieser Wall mit dem Himalaya in engstem, ununterbrochenem Zusammenhange stehe, ist nicht mehr haltbar, zumal er das ganze meridionale Gebirgssystem nun als nichts anderes betrachtet, wie den Absturz dieses Randgebirges.» Thus, already in 1880, some German geographers did not accept Markham's orography. Dealing with Markham's views the Calcutta Reviewer gives the good advice (op. cit. p. 155): »When in doubt use dots is an axiom wisely accepted by official map-makers in this country . . . . The extension eastwards of the Kuen Luen mountains, about which Colonel Walker is judiciously silent, and the physical features of the country between Lhasa and the western boundary of China are also drawn with a degree of detail which the available material hardly warrants . . . .»

According to Prof. GEORG WEGENER our topographical knowledge of Southern Tibet does not reach beyond the sacred lakes. i. e. »nur bis an die Schwelle der zusammenhängenden Hochländer des Nordens.» Festschrift Ferdinand Freih. v. Richthofen, p. 389.

[2] A Sketch of the Mountains and River Basins of India; in two maps, with explanatory memoirs, London 1870. — Compare Pl. XX.

problems that can only be settled by scientific exploration.» Amongst the other problems which had to wait for exploration was obviously Transhimalaya. For Saunders' representation of the Mekong and Salwen as tributaries to the Tsangpo-Brahmaputra was just as wrong as his representation of the Transhimalaya. In spite of there having been no exploration he draws the upper Mekong and Salwen definitely as tributaries to another river, a fact that proves that his map, in the unknown regions, is built up on hypotheses, not only regarding the rivers but also regarding the mountains. In his able and most interesting memoir Saunders says himself, under 4), regarding the Kwen-lun as being the northern limit of the Tibetan highland: »But all detailed knowledge of the interior of this extraordinary country is wanting, and it must continue to be a sealed book to Europeans until friendly pressure is put upon the Government of Peking to allow European intercourse between India and the Chinese dominions.»

Saunders also regards the Kara-korum as a »range», for he says: »The upper valleys of the Sanpu, the Sutlej, and the Indus, appear to form a huge elevated trough separating the Himalaya from the northern part of the table-land of Tibet, and from the snowy range into which that table-land contracts at its western end. This range is crossed by traders in its narrowest parts, through the Mustagh pass, and also through the Karakorum pass . . .»

One notices in Saunders' memoir the want of real knowledge. So for instance he says of the Indian water-parting that it »divides the Tibetan system from the Indus basin on the west, and from the Sanpu or Brahmaputra basin on the east. The only part of the Tibetan lake basins explored by Europeans is the western extremity crossed by the Changchenmo route between the Punjab and Yarkand.» And of the northern range of the Himalaya which divides the Sanpu from the Ganges he says: »In these regions geographical knowledge is limited to the routes of Capt. Turner, Dr. Hooker, and Major Montgomerie's Pundits; but it is high time that a resolute effort should be made to render them accessible to European science.» With so little material it could not be easy to draw reliable maps.

Saunders regards one »range» as dividing the Indus from the basins of the Tibetan lakes, which is not correct. He makes this range commence with the Karakash pass, and thinks that it should »be considered a part of the great system of mountains which surrounds the elevated Tibetan basin towards the south, and forms the water-parting between it and the basins of the Indus and Brahmaputra. Its northern base is throughout upon the great plateau which it supports and limits, while its southern base rests upon the upper courses of the Indus and Brahmaputra or Sanpu. That part which rises from the left bank of the Sanpu, has long been known to geographers as the Gang-dis-ri mountains. The western part has recently been explored by one of the Indian Pundits instructed by Major Montgomerie, and that surveyor has reported the name of one of the highest peaks to be Aling-Gang-ri. The name established on the Sanpu portion of the range is thus found

scarcely altered on the Indus part; and the western limit now assigned to the whole range in the Karakash pass corresponds exactly with the coincidence of the range and the Tibetan plateau. It is thus concluded that the pass at the head of Mr. Hayward's Kara-kash valley divides the Karakorum from the Gang-dis-ri mountains. — The waterparting of the Indus reaches the probable source of the main stream in the sacred peak of Kailas Parbat, called also by the pundit 'Gang-ri'; and continues along the Gang-dis-ri mountains, which now skirt the Sutlej as far as the sacred lakes of Rakas Tal and Manasarowar, where the Sutlej rises. Here the basins of the Indus and Brahmaputra barely meet, and the waterparting descending from the Gang-dis-ri mountains, crosses the continuous trough in which the great rivers have their rise, to flow away in opposite directions.»

Thus Saunders regards the range on which the Aling-gangri is situated as being in immediate connection with the range he calls Gang-dis-ri, a problem that could not be solved in 1870. Even in 1908 I was not able to prove whether the Aling-gangri were the northwestern part of the range which I have called the Lunkar range.

Saunders' memoir is adorned with two excellent maps. Several important geographical features in them are taken from Chinese originals, so, for instance, Lob Nor and the two great and many small lakes south of it. So is also the case with all the lakes on the Tibetan highland. The Tarok-tso and its river, the Tarcou-tsanpoutchou, the Chaktak-tsangpo breaking through the Gang-dis-ri, all is Chinese. In this respect everything is the same as on Hermann Berghaus' map in *Stieler's Hand-Atlas* for 1861. The same may be said of the mountains north of the Tsangpo, although they are, in some respects, for instance east of Tengri-nor, more correct on the German map. In both cases there is a principal range with several ramifications and there is a detached range between the Raga-tsangpo and the Tsangpo.

The scarcity of reliable material becomes the more visible if we regard Saunders' watershed of the Bay of Bengal. The upper Mekong is represented, of course, as belonging to the Bay of Bengal, which makes the drainage area much exaggerated to the north-east. Further, the river which is identical with the Chaktak-tsangpo, and the river which is the same as d'Anville's Naouc-tsanpou, have their sources north of the Gang-dis-ri and therefore the watershed makes two apophyses, proceeding northwards towards the interior of the country. As the range is the traditional Dzang of Ritter, and the two rivers come down from d'Anville, one should not expect too much exactness from this watershed, where nobody had ever been, except the Lama surveyors.

Of great interest are the two vertical sections at the top of the maps. The first represents Himalaya and Tibet between 79° and 80° and shows a bulky range between the Indus and the Panggong-tso, corresponding to Burrard's Ladak range. On the second section we get a very clear idea of what Saunders means with his Gangdis-ri Mts, for he represents it as *one* very massive range with a small secondary range

at the northern bank of the Tsangpo, and, to the north, gradually going over into the Tibetan plateau. Between Gangdisri and Kuenlun there is nothing that could be suspected as an eastern continuation of the Kara-korum, which could not be expected either, as Saunders connected the Kara-korum and the Gangdisri. Both on the map and on the section there are, however, several small ranges of hills. The section is placed about Longitude 85°. To judge from the map it would have been very much the same at 82° or 90°. And if it be remembered that 84°45′ cuts at least five different ranges, all belonging to the Transhimalaya, one will realize that the Gangdisri of Saunders is nothing but mere conjecture.

Thus, following Saunders' terminology, the series of highest peaks including Mt. Everest, is the Southern chain of the Himalaya, and he described it and represented it on his map of 1870 as an uninterrupted range. This view was adopted by all the best professional geographers.

In another important article, *The Himalayan System*,[1] Saunders, seven years later, develops his views and tells us all that was known regarding the Transhimalaya. He criticises the Calcutta Reviewer and finds it strange that he could support the same view as Herbert, whose errors were the result of his limited knowledge.

Remembering the clear and simple distinction between the systems of Himalaya and Transhimalaya, one becomes rather bewildered when one has to realize that Saunders' Gangri Mountains are the same as Markham's Northern range, and Saunders' Northern chain the same as Markham's Central chain, and the Reviewer's Southern watershed the same as Saunders' Northern chain. It does not make the problem easier that everybody should use his own terminology. So, when Saunders says that the Reviewer asserts that the peaks of the Southern Chain belong to spurs extended from the Northern, one would not quite understand what he meant, unless he had added that the separation between the two ranges was effected by such valleys as Kashmir, Spiti, Baspa, Bhagirati, Alaknanda, and others. The »summit» of the Northern Range he finds easy to trace with some distinctness, »while its northern base is unmistakably defined by the prolonged courses of the great rivers flowing through the same trough, although in oppsite directions». On the other hand, he says, »the Upper Indus and Sanpu are of such lengths and magnitudes that no one has suggested such an amalgamation of the mountains on either side of them as the Calcutta Reviewer advocates between our Northern and Southern Ranges. Not even the Reviewer imagines spurs extending across the prolonged trough of the Upper Indus and Sanpu. — But the Reviewer, following Mr. Markham, agrees with him in considering the mountains on both sides of the trough as Himalaya. In my original discussion of this subject, the Himalaya is limited between the south side of the trough and the plains of India. With the best disposition to concur in the newer view, my own method seems to me to be the more symmetrical and convenient, more consistent with the nature of rivers and mountains . . .»

[1] The Geographical Magazine, Vol. IV 1877, p. 173 et seq.

The following passage gives an idea of his views regarding the orographical situation of the Transhimalaya. »The result is very different if the summit of a mountain be taken as the line of separation between one orographic system and another. A mountain is not a line like a river, which can be separated from the rest of the ground without disturbing its form. The mountains on the north of the Sanpu are the contreforts, buttresses, slopes, or escarpments of the table-land which they support; and they cannot be cut off from it. If a drawing or model be made of that table-land, you cannot terminate it on the south at the top of its own slope, and say that the table-land is Tibetan, and the slope is Himalayan.»

This view is not at all in accordance with his map. He regards the Transhimalaya as simple slopes or escarpments of the Tibetan plateau-land, from which it cannot be separated. Such a view could only be maintained at a time when the Central Transhimalaya was still unknown. Nowadays nobody would ever think of such an absurd thing as calling »the mountains north of the Sanpu» the »slope» of the Tibetan table-land. From Ryder's map one could, perhaps, feel tempted to explain it as such. In reality it *is* an extremely well defined system of mountains, which, on a drawing or map could easily be cut off. And only when all the Transhimalayan ranges have been cut off, can one talk of a table-land at all. But Saunders says: »The whole mass, with all its slopes, forms the Tibetan Plateau, just as the whole mass, with all its slopes, from base to base, between the Upper Indus and the plains of India, forms the Himalaya.» Here clearly he distinguishes between the Himalaya south of the Tsangpo and the Tibetan Plateau, — not the Gangri Mountains, north of the river. And he continues: »It might fairly be discussed, whether the term 'Himalaya' should extend beyond my Southern Chain; and whether the Tibetan Plateau should not be limited by the rivers that form the northern base of that chain. Such a definition would be more consistent with the political limits of Tibet, and the extension of the natural features that distinguish the whole table-land from the outer slopes of the Southern Chain.»

He, however, prefers to regard the great rivers as the northern limit of the Himalaya. The next range, north of his North Himalayan Range, »rising from the beds of the Upper Indus, Sutlej, and Sanpu rivers, belongs to another system, which we call the Tibetan». Here, again he regards the Transhimalaya as a chain, for, after having defined the Tibetan Plateau between the Upper Indus and Tsangpo on the south and the plains of Gobi on the north, he says: »like the Himalayan Plateau, it is bounded by two chains of mountains, which, descending are divided by the greatest breadth of the plateau . . .»

It is of course quite wrong to make such a comparison between a Himalayan and a Tibetan plateau. For the Transhimalaya has the same rank as the Arka-tagh and Kara-korum and other systems, and rises, like them, from the Tibetan plateau-land, which is bounded only by the Kwen-lun and the Himalaya, and with such a fact the political limits have nothing whatever to do.

NAIN SING's journey of 1873—74 gave Saunders a clearer understanding of a part of the Transhimalaya, of which he says: »The Southern Chain of this part of the system is called the Gangri, or Gang-dis-ri, so far as it separates the Sanpu and Indus basins from the elevated lake basin of the Tibetan Plateau.» The Kara-korum Range he regards as a continuation of the Gangri Mountains, and he criticises SHAW who denies that Kara-korum is a range, on account of its summit being flat. But Saunders has three arguments to prove that it is a range: its height, its being an important water-parting and, finally, because »its length exceeds 300 miles». In reality it certainly exceeds 1 500 miles, but this could not be known in 1877.

Speaking of Shaw Saunders says: »The same author has also comitted himself to the opinion that the Pamir is, instead of a meridional range, a series of latitudinal ribs or ridges running east and west.» When so little was known of countries which had been visited by several Europeans, what could be expected to be known of countries where none had ever been!

Then Saunders more intimately approaches our system: »The Gangri Range is only known at its extremities. It has been crossed in several places between the Ling-tzi Plain and the Manasarowar Lake. But from thence to its eastern termination, where it meets the mountains that divide the elevated lake basin from the basins which succeed that of the Sanpu, it has been crossed in two places only, by the scientific observers, employed in Himalayan exploration. The missionaries Huc and Gabet also crossed the range and describe its difficulties. They name it the Tant-la. Of the passes crossed by the explorers, one is the Khalamba Pass, mentioned by the Calcutta Reviewer, in a part of the range which bears the local name of Nyen-chen-tang-la. The other is the Dam Lhargan Pass, and the two lie between the Tengri Lake and the Sanpu. Several altitudes of the Gangri have been observed above 20 000 feet; as the Aling Gangri 23 000 feet, the Nyen-chen-tang-la, 23,600.»

Thus in 1877 the Transhimalaya was only known at its extremities. In the middle of September 1908 the Times' correspondent in Simla telegraphed, after my return to this place and according to the information I gave him: »The eastern and western parts (of the Transhimalaya) were known before, but the central and highest part is in Bongba, which was previously unexplored.»[1] These versions are very like each other. The Tibet Frontier Commission was the only expedition which, in 1904, had added new knowledge about the Transhimalaya, improving enormously Nain Sing's survey. But it had not entered the unknown country and Saunders' words were as correct in 1908 as thirty years earlier. For Saunders was a sufficiently accomplished geographer to understand that the system had to be *crossed* before it could be *known*. And he did not know of any such crossing between the region N.E. of Manasarovar and the Khalamba Pass. Between these two limits the system remained uncrossed for another thirty years.

[1] Times, September 18th, 1908.

In spite of the 500 miles unknown, Saunders has drawn on his map one range north of the Tsangpo. This was an easy task, which had been tried before, and indeed it seemed very likely that the mountains north of the Tsangpo must be parallel with the Himalayas and with the valley of the river. But when Saunders leaves this ground where he has every probability on his side, and proceeds to the north-east, he is completely lost. Here it is impossible to follow him. For he says that Huc and Gabet crossed the Gangri range, which they called Tant-la. Comparing this statement with Dufour's map of Huc's journey, one arrives at the conclusion that the missionaries must either have crossed the range twice or not at all; or, their route must have followed it parallelly for a very long distance from Mur-ussu to the place where they finally crossed it, an explanation which cannot be gathered from Huc's book. Here Saunders has fallen into the same error as so many others who, with insufficient material, have tried to explain the orography, and instead confounded the systems and joined two different systems into one.

Remembering Saunders' own words that the Gangri Range is only known at its extremities, one feels surprised to read a few lines lower down: »Parallel with the Gangri Range, but at a distance generally of 70 miles, the plateau itself has been recently explored along a route between the Pangong Lakes and Lhasa.» For how could he know that it was 70 miles when the »range» was unknown between its extremities.

Saunders reminds us of the fact that the Kwen-lun Mountains are known to be situated between the Tibetan plateau and the Gobi Desert at the western extremity of the plateau and as far east as 81°30′, and that the range which was crossed by Huc and Prshevalskiy south of Koko-nor was »said to be a continuation of Kuen lun by various authorities». This »appeared to be more probable than any other theory». Saunders has drawn it as *one* continuous range on his map. At 90° E. long. the Kwen-lun consists of at least five different ranges. When these were discovered and partly explored by Prshevalskiy, who would have been so tactless as to say that Prshevalskiy made no discoveries here, as the whole length of the Kwen-lun was already marked on Saunders' map! A map of a country where nobody has ever been has of course no value at all.

Finally Saunders alludes to the way in which he has arrived at the construction of the different ranges on his map. He even reproduces Brian Hodgson's map of 1857 on the same scale as his own, to show the difference of the representation of Himalaya in both cases, and, as he says, »thus the comparison of the two is facilitated as much as possible». The same can be said of the Nien-chen-tang-la and Gangri Mountains. These have been improved very much indeed from the material brought back by the Pundits.

East of Lhasa and stretching to the N.E. he has entered on his map a range, which from beginning to end is an invention of his own, for not a suspicion of it exists in reality. It is pierced by some considerable rivers. He says of its creation:

»The Lhasa River divides this range from the Tangla or Gangri Mountains, on the opposite side of the valley; and we have prolonged it as the edge of a steppe as far as the Bayan Kara Mountains — a suggestion which seems to us to be concurrent with the aspects of the smaller streams.»

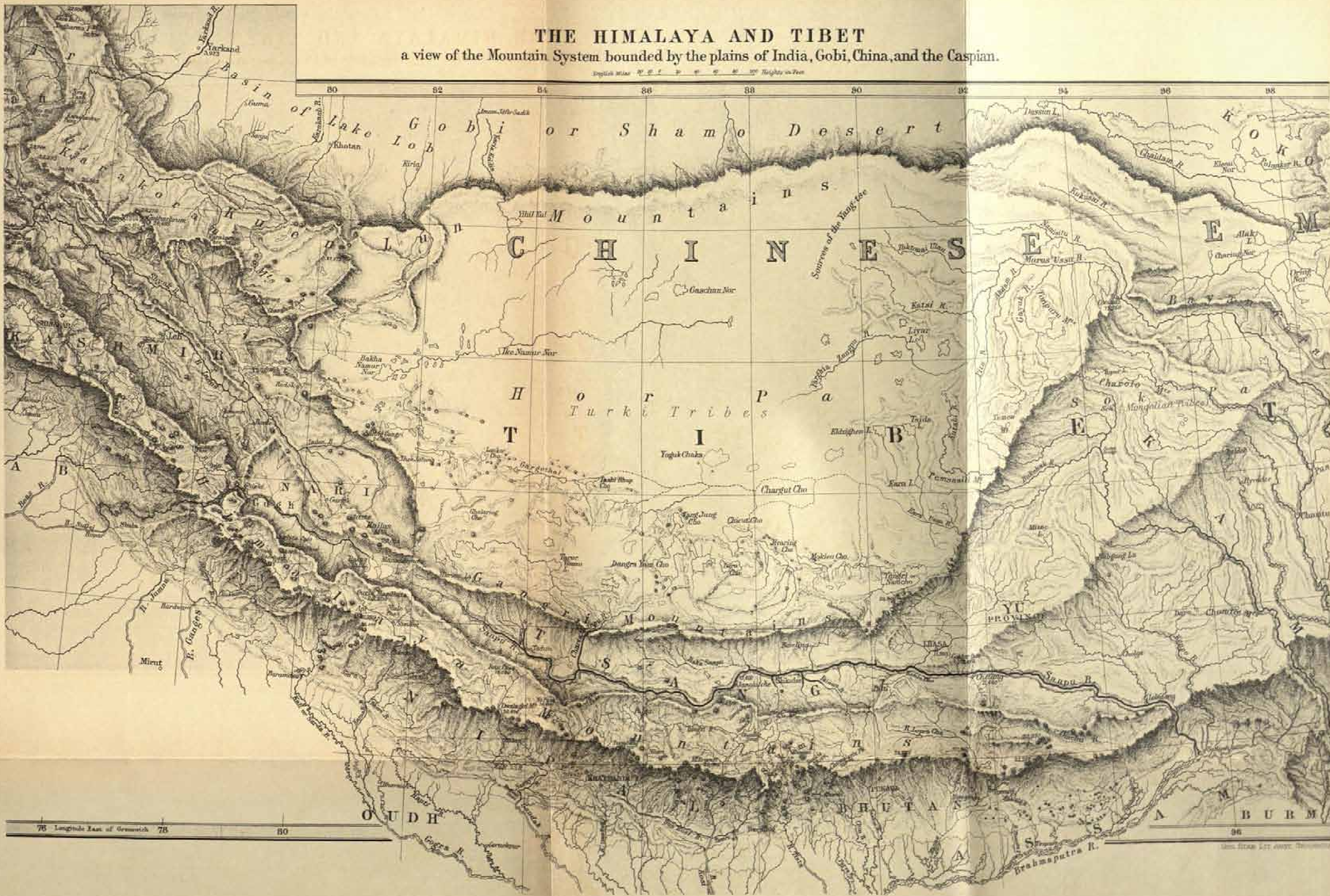
Of the N.E. prolongation of the Gangri Saunders says: »In like manner, we have delineated a probable prolongation of the Gangri to the north, following a line of water-parting for a portion of the way, and then taking certain bends in the streams as indicative of their passage of the chain.»

The way in which Saunders has drawn these two ranges and the eastern Kwen-lun may serve as an illustration of the way in which he has drawn his Transhimalaya. The following passage is also conjecture: »The Lake Plateau is called Hor Pa, and is occupied by Turki tribes; and we believe that Hor means highland — at least, it does in some Oriental languages.» We have seen above from where this extraordinary information came!

Comparing Saunders' maps of 1870 (Pl. XX) and 1877 (Pl. XXI) we find that the Gangri Mountains have been improved, in 1877, chiefly in the east, where the system, in the meantime had been crossed in Khalamba-la and Dam-largen-la. Nain Sing's journey north of the system has not changed its appearance very much. Only the Tarcou-tsanpou has disappeared. The mountains Nain Sing saw south of his route are represented as very insignificant, detached ranges. All this part is, of course, just as on Nain Sing's map, quite wrong. South of the detached ranges the Gangri Mountains tower themselves up to one tremendous range. The Naouc-tsanpou has disappeared. Nain Sing's Charta-Sanpu has been reconciled with d'Anville's Sanki Tsanpou, somewhat in the same manner as on the map of 1870. But why has Taruc Yamzu Lake and its rivers been so considerably changed? No European and no Pundit had been there in the meantime. And none had been there before 1870, nor after 1877, until 1908. From some points of view the Gangri system is better on the map of 1870, for there it is broader and has many ramifications, whereas on the map of 1877 it has no ramifications at all, but forms one compact range.

Saunders, map of 1877 was the same as the one he drew to Markham's books.[1] In 1877 RICHTHOFEN'S *China*, Vol. I, was published. Richthofen reckons the Transhimalaya to the Himalayan system. North of the upper Indus he has five or six Transhimalayan ranges, N.E. of Manasarovar they are four, N.E. of Tuksum three, at Raga-tsangpo two, and north of Shigatse only one. This one range, which is situated farthest north, is in connection with Aling Gangri, to the N.W. of which there is an interruption before the Kara-korum begins. Richthofen has drawn Huc's Tang-la very much like Saunders. But he makes it belong to a special system of four parallel

[1] A Memoir on the Indian Surveys, London 1878, and: Narratives of the Mission of George Bogle to Tibet etc., London 1879; both second edition.



Tr. Saunders, 1877.

ranges stretching to the N.E., and called by him »Sinisches System«. This is mere speculation which causes great confusion.

Richthofen has not got any impressions from Saunders' map, for he does not even mention it. Nor has Saunders been influenced by Richthofen for the two editions of his map are the same, and at the end of his article in the *Geographical Magazine* 1877 he says that he had just seen Richthofen's work in July 1877. Therefore, Richthofen and Saunders, when speculating each in his quarter, over the orographical arrangement in Tibet, have arrived at somewhat similar results. The difference is that Richthofen has several ranges in the western Transhimalaya and only one in its eastern part, whereas Saunders has only one Transhimalaya, and Richthofen has four and a half ranges of the Tang-la type, whereas Saunders has only two.

Regarding the Himalaya Saunders very conscientiously gives his authorities and has even a list of the co-ordinates of the highest peaks, taken from the *Records of the Trigonometrical Survey of India*, Vol. 15, 1861.

As to the Gangri Mountains he is not less conscientious in giving his sources at its east and west extremities. He also tells us the limits between which the system is unknown. To show us from where he has got the central part as it were he reproduces Hodgson's map, only adjusting the situation so far as to bring it in harmony with the Pundits' discoveries. And we have seen before from where Hodgson got his information, namely, from Ritter and, partly, Huc. Ritter got his from Klaproth, and Klaproth his from the Chinese sources. It is curious to see how in this chain of development d'Anville plays such an unimportant part. Ritter, Humboldt, Hodgson and Saunders have only one range. D'Anville had several and was, so far, nearer the truth than those who came after him.

With all due admiration for the splendid geographical work of Trelawny Saunders it must be said that to the knowledge of Transhimalaya he contributes absolutely nothing. The only mark that he has left behind him in this part of Tibet is that he has dogmatized an error which was already fifty years old.

CHAPTER XXII.

E. T. ATKINSON.

In his important work on the Himalayan Districts of north-western India, E. T. ATKINSON pays attention chiefly to the Himalaya, and cannot, of course, have much to say of the mountains north of the Tsangpo. From his *résumé* of Himalayan exploration some extracts may be sufficient to give a general idea of his views.

Regarding High Asia as a unity he says: »The Himalaya itself is but the southern belt of that great girdle of mountains which encloses within them the country of which the southern half is commonly called Eastern Turkistán. From or through the southern slope of the Himálaya flow the great rivers known as the Indus, Ganges, and Brahmaputra. To the east, the continuation of the Himálaya is traced in the mountain ranges through which flow the Yangtse-chiang and the Hoang-ho, and which are prolonged to the north in the Ala-shán, Inshán and Khing-han mountains.»[1] In this view he has, no doubt, been misled by Saunders' map.

In his *Early attempts at generalization*[2] Atkinson begins with Herbert, and says that his idea of the country north of India was apparently derived from maps only. »He considered the upper beds of the Brahmaputra and the Satlej as forming part of the barrier zone which surrounds the central tract, and not as a part of the plateau itself.» Herbert was the first to give a systematic account of the Himalaya as a whole, but »his errors were those of his time, when the knowledge even of descriptive geography was in its infancy.»

Then Atkinson proceeds to Hodgson, who was the first to explain in a scientific way the relations between orographical and hydrographical arrangement. »Hodgson's Himálaya proper is the ghát line or watershed between Tibet and India, and the watershed between the valleys of the Indus and Sanpu and the great plateau is called by him Nyenchhen Thangla Chain.»

Richard Strachey was the first to point out distinctly »that the Himálaya was in truth the broad mountainous slope of the great Tibetan table-land descending to

[1] The Himálayan Districts of the North-Western provinces of India. Allahabad, 1882. Vol. I, p. 1 et seq.

[2] Op. cit. 4.

the plains of Northern India, while a slope of corresponding character descending to the north is known as the Kuen-lun».

Dealing with Dr. Thomson he says that this distinguished traveller acknowledged the unity of the Himálaya-Tibetan region. Referring to A. Cunningham he points out his parallel chains beyond the Himalaya, »comprising at least three distinct ranges of mountains, which Cunningham proposes to call the Trans-Himalayan, or that which divides the head waters of the Satlej from those of the Indus and extends to the western limits of Rongdo and Astor; second, the Kailás or Gangri range which runs through the midst of Western Tibet along the right bank of the Indus to its confluence with the Shyok; and third, the Trans-Tibetan range, also called Bolor and Kárakoram». Atkinson finds these distinctions purely local and geographical but also so far convenient as to be accepted.

The next contributor, Henry Strachey, shows us that the Indian watershed is not the great Himálaya as seen from India, but is situated in a succession of valley heads, and Sir Henry Rawlinson recognises the unity of the entire mass, and writes that the »whole country between India and Tartary may be considered as a broad mountain range, the Himálaya forming the southern crest, and the Kuen-lun the northern».

After having referred to the views of Saunders, Markham and the Calcutta Reviewer, Atkinson comes to the latest contribution to the physical geography of the Himalaya, namely H. Blanford, who, in his *Manual of the Geology of India*, »considers the Himálaya to form a curved belt of mountains with their convexity to the southward which mark the southern scarp of the Tibetan plateau as the Kuen-lun define the northern . . .»

Atkinson's final conclusions are important as giving us an idea of the store of knowledge of his time. He says: »Though year by year fresh materials are added to our stock of knowledge regarding the Himálaya, they are yet too imperfect for us to offer little more than a suggestion as to the views that should be adopted regarding its structure. A glance at Mr. Saunders' map will show us the vastness of the subject, and that the Himálaya of Kumaon and Garhwál, with which we are more immediately concerned, is but a very small portion of the great girdle of snowy peaks that uphold between them the elevated plateau of Tibet.» Having reviewed the different theories he says: »To our mind the recognition of the unity of the entire Himálaya-Tibetan system is the most important of them all, and that alone which will lead to practical results. The division of the Himálaya into ranges may be allowed as a matter of convenience, but should not be permitted to cloud the great fact that all are but variations in the southern slope of the great table-land due to the influence of the elements on the materials of which they are composed, and to the disturbing action of subterranean forces. We can lay down the line of water-parting and the line of greatest elevation with some precision . . .,» the rest and the final word, he correctly says, must be given by the geologist.

As to the boundaries of the Himálayan system he says: »For our part we accept the popular definition of the Himálaya as extending from the gorge of the Indus on the west to that of the Brahmaputra on the east, and from the upper courses of the main branches of those rivers on the north to the plains of India on the south, speaking of its connections beyond those limits as the western and eastern extensions respectively.»[1]

When Atkinson regards the upper courses of the Indus and Brahmaputra as the northern boundary of the Himalaya, he is no doubt right. But further on in his great work he says that the limits can be extended both east, west and north.[2] When extending the boundary to the north, it would mean that the Transhimalaya should be included, which, so far as I can see, is both unnecessary and impractical.

Speaking of the rivers he says: »We thus see that the northern crest of the table-land or the summit of its northern slope practically forms the water-parting between the rivers that flow southwards and those that lose themselves in the plain of Gobi.» He has a distinct feeling of the existence of a circular water-parting all round the interior of Tibet. Its northern section he calls, with Henry Strachey, the Turkistan, its southern section the Indian water-parting.

He has found that the water-parting of the Indus follows the Hindo-kush 300 miles and then the Muztagh range, — for the name Karakorum should only be restricted to the Pass —, »but cuts through it around by the Karakorum pass to the north, so as to include the tributaries of the Shayok, and proceeds in a south-easterly direction by the Aling-Gang-ri to its junction with the Gangri at Kailás, where a transverse ridge separates the head-waters of the Indus, the Brahmaputra, and the Trans-Himálayan feeder of the Ganges system».

In the following passage, where he comes into more intimate contact with the Transhimalaya, there is much both true and wrong, for his sources are the Pundits' real observations as well as their and Saunders' theories, with which he treats as if they were Gospel: »The Brahmaputra basin in its full extent has not been explored, but sufficient evidence has been collected by recent travellers to show that from the water-parting between the sources of the Brahmaputra and the Indus, the northern water-parting of the former river continues in a range of lofty peaks on its left bank to the bend towards the south, by which it reaches the plains of India. This range has a direction south-east, and to the west of the 86th meridian is sufficiently distant from the Brahmaputra to allow of such affluents as the Chachu and the Charta rivers. About the 86th meridian, a line of peaks culminating in the Tárgot La streches in a north-easterly direction to the Gyákhárma group of peaks, south-east of the Kyáring lake, one of the sources of the Nák-chu-kha. The drainage of the southern slope of the range is sent by the Dumphu-chu into the Kyáring lake, so that the northern

[1] Op. cit. p. 16.
[2] Op. cit. p. 60.

water-parting of the Brahmaputra must here approach much closer to the river and run in a south-easterly direction. On the 89th meridian, it descends as low as the 30th parallel in the Shiang Lahu range, which appears to be connected with the great Ninjin-thángla range of snowy peaks to the south of the Jáng Namcho or Tengri-nor lake with a trend to the north-east, for it gives the head-waters of the Ki-chu or Lhása river from its southern slope, as well as other important streams further east, regarding which our information is still very imperfect. To the north-east we find the Nák-chu-kha or Hota Sanpo, a large river that issues from the Chargut lake about north latitude 32° and east long. 89°, and flows eastward, having its drainage area on the south, bounded by the water-parting between it and the Brahmaputra basin.»

Atkinson thus believed, from Nain Sing's exploration, in *one* range of lofty peaks north of the Tsangpo. He regards Nain Sing's rivers, Chachu and Charta, as coming from this range, which does not agree with his map, where the Charta pierces the range. His general physical geography in these regions is very clever, — it has only one fault: to be built upon descriptions of rivers and ranges which do not exist in reality. The Dumphu-chu of Nain Sing has turned everything, not least the water-parting, upside down. The same is the case with the river Nák-chu-kha and with the north-eastern continuation of the Nien-chen-tang-la. He believes that the lakes on the plateau-land are connected by the Nák-chu-kha, which finds its outlet in one of the great rivers to the east of the Dihong.[1] He regards the northern part of Tibet as a great uninhabited plain or a plateau of great elevation.

But he also says that so little is known of the Tibetan plateau, »that it is impossible to offer any general account of it based upon actual observation; but as far as we may judge from those parts that have been explored, it appears that the surface is, with few exceptions, broken up into a mass of mountains, the general elevation of which, valleys as well as ridges, is very great; and there seems no reason for supposing that either the Himálaya or Kuenlun have any definite special existence as mountain ranges apart from the general elevated mass of which they appear to be the two opposite faces . . .[2]»

To a certain extent he is right in joining Himalaya and Kwen-lun intimately with the great bulk of the highland, but on the other hand all the different systems are separate individuals, which, taken together, form this immense plateau of the earth's crust. The interior of this high-land he believes to be broken up into a mass of mountains. The parallelism between all these different systems could of course not be known in 1882. Only 25 years later was the first attempt made to show that this parallelism prevails all over Tibet and that Tibet is what the Germans call a »Faltenland», and as such greater than any other on the earth.[3]

[1] Op. cit. p. 73.
[2] Op. cit. p. 116.
[3] See my Scientific Results, Vol. IV, maps facing pp. 565 and 581 showing the parallel systems of Tibet.

How little the geology was known may be seen from the following passage, dealing with STOLICZKA's section in the west: »It cannot be supposed that the rough cross section we have sketched near the west end of the Tibetan mountain mass can be taken as a type for the immense region to the east. Already within known ground, some interruptions can be pointed out to the longitudinal extension of the several structural zones. Of the continuation of the Kárakorum and Kuen luen, and even of the middle gneissic range, we may be said to know nothing. Stoliczka describes the nummulitic band as completely stopped out against the syenite at Kargil; and although this obtruding rock is at least in part of later date, it is suggested that the termination of the eocene beds here is probably aboriginal. The eastern extension of these deposits is quite unknown, save that nummulitic strata occur in the far east north of Sikkim.»

Atkinson is right. It would be ridiculous to expect even the remotest knowledge of the geology further east from the scanty researches carried out in the west. We have seen that the information brought back by Pundits from west and east is not sufficient to interpolate the orography of the central parts of our system. How much less then the geology! Only the eight geological profiles I have made across the system, compared with the researches of the Stracheys, Godwin-Austen, Hayden and others, and which are elaborated and published by Professor A. HENNIG as Vol. V of the present work, will give an idea of the geological structure of the Transhimalaya.[1]

[1] Atkinson's volume is adorned with a map. Of this map, Pl. XXII, it has been said (January 1909): »The delineation of the range in the map issued (1882) with Vol. I of Atkinson's 'Himalayan Districts' is practically identical with that shown in Dr. Sven Hedin's sketch-maps which have appeared in various magazines and newspapers.» (Geographical Journal, Vol. XXXIII. Jan. 1909, p. 98.) Atkinson himself says in his preface: »The map of the Himálaya-Tibetan region is taken from one prepared by Mr. Trelawnay Saunders, omitting the eastern portion.» So that the map which was said to be practically identical with mine, is simply an exact reproduction of our old friend, that of Saunders! Nobody would have been more astonished than Atkinson himself had he known that he should be brought forward as an authority on the Transhimalaya. And there is a new link attached to the chain, which runs: The Chinese original sources, Klaproth, Humboldt, Ritter, Hodgson, Saunders and Atkinson. The Chinese explorers are the root; Klaproth is the translator; Humboldt and Ritter quote Klaproth; Hodgson quotes Ritter, Saunders is, for the unknown central section, combining the Chinese, Hodgson and the Pundits, and Atkinson has copied Saunders. Had it been desirable to diminish the value of fresh European exploration, it would have been better to go back to the Chinese root than to bring forward the last link in the chain.

THE HIMALAYA AND TIBET,

A View of the Mountain System bounded by the plains of India, Gobi, China, and the Caspian.

Atkinson, 1882. (Saunders' map of 1877).

Gen. Stab. Lit. Anst. Stockh.

CHAPTER XXIII.

SARAT CHANDRA DAS' JOURNEY TO LHASA.

In June 1879 SARAT CHANDRA DAS set out for Tashi-lunpo, accompanied by Lama YGYEN GYATSO, a Tibetan from Sikkim. They remained in Tashi-lunpo for six months. The route taken was the same as on his second journey.

In November 1881 he started on his second journey, again accompanied by Ygyen Gyatso, who acted as his surveyor »though much of the later work, including the extremely important survey of Lake Palti (Yamdo Tso), was done by the traveller himself», as ROCKHILL says.[1]

Tashi-lunpo was his head-quarters, from where he made excursions, — from Sakya in the west to Samye and Tsetang in the east. He also visited Lhasa, which had been done by native explorers only twice before, Nain Sing in 1866 and KISHEN SING in 1880.

After his exploration in the valley of the Yalung he returned to India, after a journey of 14 months. As a discoverer and publisher of Tibetan texts Rockhill compares him with Csoma de Körös.

Sarat Chandra Das left Darjiling, November 7th, 1881. He crossed the passes Kanglachen-la and Yaru-la. Between Kurma and Yago he passed the great watershed between the Arun drainage area and the Shab-chu, a tributary to the Tsangpo. He has not a word to say about it, seems not even to be aware of the importance of the place. On December 9th he reached Tashi-lunpo.

From there he made a trip up the Nyang-chu valley which he regards as one of the richest in Tibet; »it extends from Shigatse to about 15 miles beyond Gyangtse, a distance of from 60 to 70 miles, and has an average breadth of 10, every inch of which is cultivated». After having visited Dongtse and Gyangtse he returned to Tashi-lunpo.

On April 26th, 1882, he again left Tashi-lunpo, this time for Lhasa. Again he passed Dongtse and Gyangtse. Following up the Nyang-chu he ascended the Karo-la, »a lofty plateau from which we could distinguish to the north-east the snow-covered slopes of the Nojin-kang-zang . . . On this plateau, which is about five

[1] Journey to Lhasa and Central Tibet. Edited by W. W. Rockhill. London 1902.

miles broad where we traversed it, there is fine grazing, and we saw numerous herds of yaks by the sides of the little streamlets which meander over its surface, the one flowing westward becoming the Nyang-chu; the other flows to the east, and is called the Kharnang-phu-chu and along this the road led.»

The next places visited are Nagartse and Samding-gompa. Lake Yamdo he says is also called Yum-tso or »turquoise lake». May 28th he followed the shore of the lake to the foot of Kamba-la.[1] »The ascent was comparatively easy; on the rocks by the wayside were painted in many places images of Buddhas and Bodhisattvas . . . From this point I enjoyed one of the grandest views I have ever had in Tibet — the valley of the Tsangpo was before me, the great river flowing in a deep gorge at the foot of forest-clad mountains.» He does not mention the »nivosi montes ad Boream» which were seen from here by the Capuchins.

Beyond Toi-tsi the chain bridge, *chag-zam*, was reached; »the bed of the river here is about 400 feet broad, but at this season of the year it spreads out several hundred feet beyond the extremities of the bridge, and travellers are taken across in boats». *Viâ* Chushul and Netang he reached Lhasa, May 30th, but only remained till June 13th, when he left for Tashi-lunpo.

Ygyen Gyatso made an excursion to Sakya and Sarat Chandra Das gives some extracts from his diary. He started on July 21st and after two days crossed to the left bank of the Tsangpo near Tashi-gang, and camped in the valley of Tang-pe. Thence he continued to the district of Tanag, »where a fine quality of pottery is manufactured». On July 26th he »crossed the Tanag Tong-chu by an iron suspension bridge, and travelling westward, stopped for the night in the lamasery of Tubdan». This bridge is probably situated some way up the valley as I could not see it when passing the place in February 1907. Two days later he reached the hot springs of Burchu-tsan 12 miles up in the valley. The next day Jeh-la was crossed and the village Keshong reached. The 30th he reached the old village of Shendar-ding near which is the »famous Bonbo monastery of Rigyal Shendar».

From Non-chu he went to Rag-tso ferry, crossed the Tsangpo and »halted for the night at Tondub ling, in the district of Je-rong», which is on the southern side of the river, opposite my Je-shung.

At Phuntso-ling he found 500 Lamas. From Lhartse he went to Sakya and thence to Dobta on the Tsomo-tal-tung lake the southern shore of which he followed. Ygyen reached Shigatse on August 29th.

At the end of October Sarat Chandra Das explored the southern shore of Yamdotso. From the eastern end of the lake he went north to the water-parting pass of Tib-la, »from the top of which he had a magnificent view of the whole lake country, the like of which he had nowhere seen in the Himalayas». Then he visited Samye-gompa. At Sangri Khamar, not far below Tsetang the surface of the Tsangpo »is

[1] Op. cit. p. 142.

broken by huge masses of rock». At Nango ierry he crossed the Tsangpo and went up the Yarlung river a short distance. Above Tsetang he speaks of heavy sands. On December 27th he reached his home in Darjiling.

Sarat Chandra Das' book is full of human interest, religious, social, literary news of highest value and the more important as Rockhill has provided it with notes. His descriptions of temples, habits, ceremonies, religious festivals, the life of monks and laymen, is most interesting and instructive. But there is hardly any geography in the whole book. His attention has been taken up by the people, not by the country, and only occasionally he speaks of its beauty.

But the map is remarkably good although lacking orography. As a surveyor he seems to have been very careful, for Rockhill says:[1] »The discovery by Sarat Chandra in 1882 of the true dimensions and shape of Lake Palti, seemed to Sir Alfred Croft, so important that in June, 1883, he despatched the lama to cover the same ground in order to check off, verify, and complete the survey of the Babu. This he successfully did, adding only to the latter's work a small portion to the south-east of the lake, but establishing the great accuracy of the previous survey.»

[1] Op. cit. p. X.

CHAPTER XXIV.

RECLUS AND RICHTHOFEN.

The material which has been dealt with in the preceding chapters was used by ELISÉE RECLUS when, in 1882, he wrote his admirable description of the orography of High Asia.[2]

He regards the range which forms the northern boundary of Tibet Proper and the southern boundary of Katchi as a prolongation of the Kara-korum Mountains.

»A l'orient du Kachmir et du pays de Ladak, ce faite se replie au sud-ouest, parallèlement à l'Himalaya et projette à gauche plusieurs chaînons qui vont se perdre dans le plateau, tandis que la chaîne maîtresse, ravinée et même traversée par des affluents du Tsangbo, par ceux de quelques bassins fermés, et enfin vers l'est par des tributaires des grands fleuves orientaux, va rejoindre le Tang la, au sud du Tengri nor.»

We easily recognize in this passage the erroneous opinion that the mountains north of the Tsangpo should consist of only one range pierced by some of the northern tributaries of the Tsangpo. And we also remember from where the false opinion dates that the Transhimalaya and the Tang-la should be one and the same system.

Although his opinion is based on insufficient and unreliable information Reclus is right in detaching the Targot leh (Targo-gangri) and Gyakharma from the Transhimalaya. He says:

»En arrière de cette chaîne se dressent plusieurs hauts massifs de montagnes, entre autres celui de Targot leh, qui domine le lac Dangra-yum, et que l'explorateur Naïn-singh croit être le groupe le plus élevé de toute la région des plateaux au nord de l'Himalaya. Plus à l'est, le massif de Gyakharma baigne également sa base dans les eaux d'un grand lac, le Nyaring tso, et reste séparé de la chaîne bordière du sud par la vallée du Dumphu, l'un des tributaires du Nyaring. Des sommets de 6 500 à 7 000 mètres se montrent sur la chaîne que longe le cours du Tsangbo et qui n'est pas encore nommée d'une manière définitive.»

Reclus uses the name Trans-Himalaya in a more extended sense than Cunningham, as will be seen from the following passage:

»Une autre arête de croupes et de sommets, que l'on pourrait désigner par le nom de 'Trans-Himalaya', se développe entre les monts de Tsang ou Gang-dis-ri et les pics étincelants

[2] Nouvelle Géographie Universelle, VII, L'Asie Orientale, Paris 1882, p. 35 et seq.

de l'Himalaya et des deux côtés épanche des glaciers. La dépression du Tibet méridional se trouve ainsi divisée longitudinalement, de l'ouest à l'est, en deux dépressions secondaires parallèles l'une à l'autre. La chaîne médiane, qui continue une des arêtes du 'petit Tibet' de Ladak, dresse ses hauts langour, ou pics revêtus de neiges persistantes, au sud de la vallée du Satledj, puis au sud de celle du Tsangbo. Moins élevée que l'Himalaya, elle a pourtant plus d'importance comme faîte de partage, et les eaux courantes la traversent de cluses moins nombreuses: sur près de 800 kilomètres, le Trans-Himalaya limite parfaitement le bassin du Tsangbo comme arête de séparation entre les eaux . . .»

Thus Reclus' Trans-Himalaya is situated south of the Tsangpo the whole way from Manasarovar to some distance east of Yamdok-tso.

Reclus also believes in the existence of a transverse threshold between the Himalaya and the mountains north of the Tsangpo. I have mentioned above that such a threshold can hardly be said to exist, as the longitudinal valley can be followed the whole way from Chema-yundung to Manasarovar. Reclus says:

»Le seuil transversal qui réunit l'Himalaya au Gang-dis-ri, et par cette chaîne à tout le plateau du Tibet, n'est pas seulement le lieu de passage nécessaire entre les deux grandes vallées qui se prolongent au loin à travers des contrées diverses, c'est aussi comme la racine par laquelle le plateau du Tibet, le plus vaste de la terre, tient à la plus haute chaîne, l'Himalaya.»

On Reclus' excellent little sketch-map, drawn by C. Perron from Walker,[1] this threshold has not been marked.

Further on in his description[2] Reclus shows that he has no clear conception of the relief of the country north of the Tsangpo, for he says:

»Au nord de la dépression dans laquelle coule le Tsangbo, le plateau du Tibet a été découpé en d'innombrables vallées par les eaux courantes: c'est, en grand, le phénomène qui se produit au bord des terrasses d'argile où les averses creusent des ravines profondes.»

On the other hand Reclus had hardly anything else to do than to accept Nain Sing's emissary from the Chargut-tso as the upper course of Huc's Nap tchou.

In the next volume of his great work Reclus gives the dimensions of the Himalaya and calculates that if this mountain mass were spread all over the surface of the continents the average height of Asia would rise 18 metres. And he continues:[3]

»Mais dans cette évaluation on ne tient aucun compte de la chaîne bordière proprement dite du haut plateau de Khatchi. Cette chaîne, on le sait, continue, parallèlement à l'Himalaya, la rangée des monts Karakoroum, et sous divers noms se prolonge au nord des sources du Satledj et de la vallée du Tsangbo, puis, au sud du Tengri-nor, se confond avec le massif du Nindjin tang la: c'est la crête que plusieurs géographes, depuis Klaproth, désignent sous le nom de Gang-dis-ri. Un des monts les plus fameux de la mythologie hindoue, la pyramide du Kaïlas, dont les neiges se reflètent dans les eaux du lac Mansaraour, est l'un des sommets de cette chaîne du Gang-dis-ri . . .»

[1] Op. cit. p. 37.
[2] Op. cit. p. 55.
[3] Nouvelle Géographie Universelle, VIII, l'Inde et l'Indo-Chine, Paris 1883.

Reclus does not count the Gang-dis-ri as part of Himalaya.[1] He distinguishes three parallel systems: The Himalaya, with the high peaks, the Trans-Himalaya or water-parting, and the Gang-dis-ri, or my Transhimalaya. He is correct in regarding the Gang-dis-ri as a continuation of the Kara-korum, as the Transhimalaya is probably the eastern prolongation of the southern Kara-korum system.

On Reclus' map of India and Tibet (Pl. XXIII) the river Tsangpo is drawn from Nain Sing and its northern tributaries from d'Anville. The Gang-dis-ri is pierced by the Chaktak-tsangpo just as on Nain Sing's map, although Reclus places the range further north than Nain Sing and others. Reclus has the sources of the Chaktak-tsangpo at about 31°20′, which is one degree too far north.

LÉON FEER in his little book on Tibet[2] has the following view of the orographical arrangement: »Le système Himalayen est formé de trois chaînes parallèles (méridionale, centrale, septentrionale) . . .» The two last belong entirely to Tibet, the first only partly. He regards the Gang-ri (Kailâsa) as being the highest summit of the northern range. In the far east the three ranges »sont coupées par la chaîne transversale des monts Bayan-Kara . . . à l'extrémité occidentale, la chaîne septentrionale, qui prend le nom de Karakorum, se relie aux monts Kien-loun». With the meagre material available it is not surprising that different geographers should arrive at such different results.

The greatest name in Asiatic geography has, of recent years, been that of Baron FERDINAND VON RICHTHOFEN. In the first, second and fourth volume of his great monumental work *China*, published 1877 to 1883, he has given the world the epoch-making results of his own researches. We are indebted to the indefatigable work and knowledge of Doctor ERNST TIESSEN of Berlin for the publication of the great remainder of Richthofen's journals and annotations, a service to geographical science for which Doctor Tiessen cannot be too highly praised. The chapters which deal with the modern exploration in Tibet seem to have been written by Richthofen about 1896, for the expeditions undertaken after this year are not mentioned. But Doctor Tiessen has added all contributions of later years and thus brought this great standard work up to date.

With admirable clearness and perspicacity Richthofen has made use of the insufficient material existing, for drawing out orographical and geological conclusions. In his *Fünfter Abschnitt* of Chapter VI Richthofen considers the mountains round the sources of the Yangtse-chiang and their continuations. There are four rivers: Namtshutu, Namtshutola-muren, Toktonai and Murui-ussu, and three ranges: Kokoshili, Dungburé and Bukha-mangna, crossed by Rockhill. The continuation of these ranges is shown by the routes of Prshevalskiy and Krischna. And Richthofen says of their further prolongation to the west:

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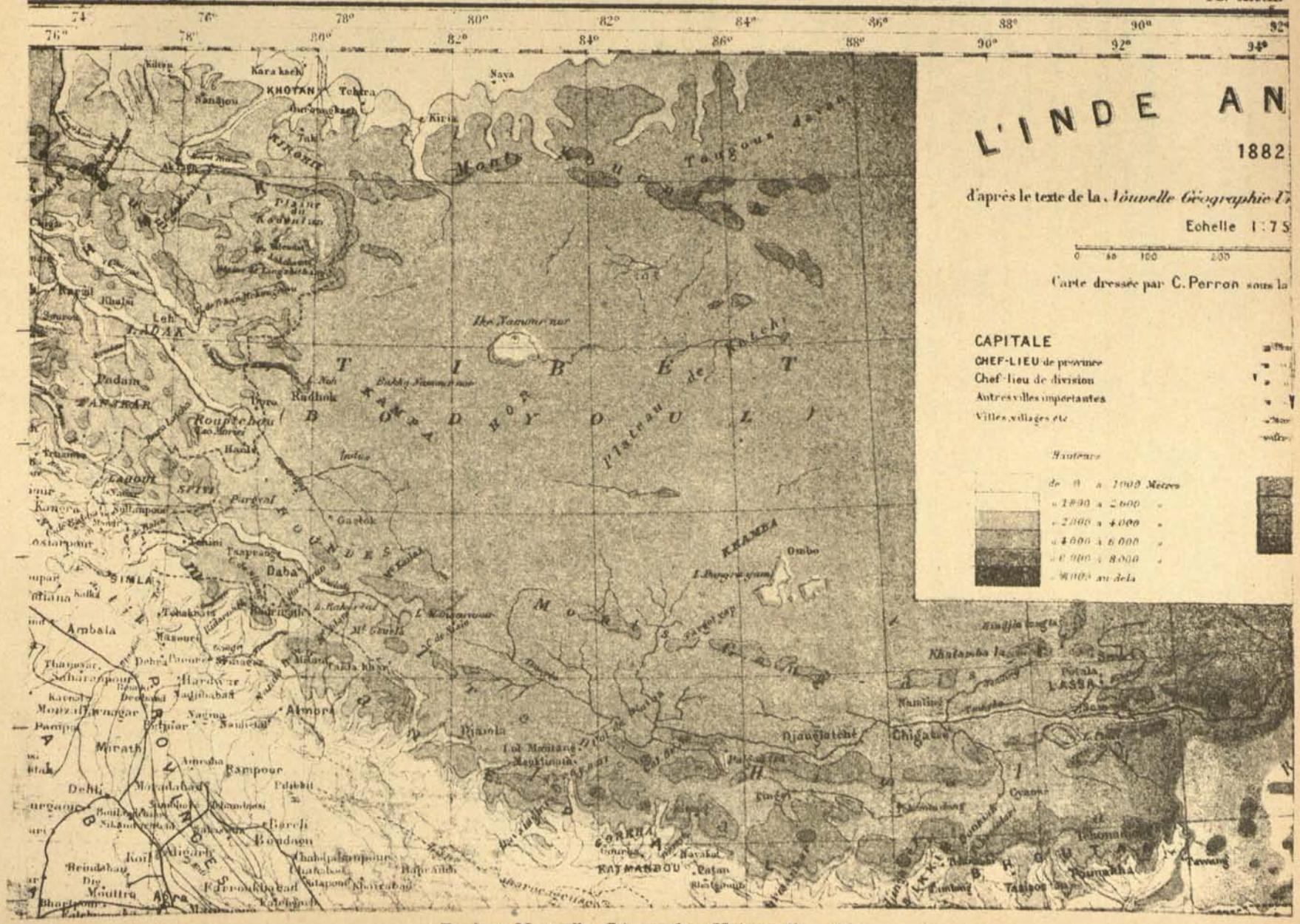
[1] Op. cit. p. 40.
[2] Le Tibet, le Pays, le peuple, la réligion, Paris 1886.



Reclus: Nouvelle Géographie Universelle, 1882.

GEN. STAB. LIT. ANST. STOCKH.

»Westwärts haben wir zuerst den Reiseweg, dessen Karte der Prinz von Orléans entwarf und den Bonvalot beschrieb . . . Weitere zwei Grad westlich von ihm liegt der Weg, auf dem Littledale nach Süden ging. Beide bieten uns willkommene Ergänzungen . . . Es ist nicht unwahrscheinlich, . . . dass der Prinz von Orléans und Bonvalot die äussersten Quellen des Yangtszĕkiang entdeckt haben wie sie es selbst vermuteten . . . Gehen wir über den Littledale'schen Weg nach Westen hinaus, so haben wir völlig unerforschtes Land. Bezüglich der weiteren Fortsetzung des Akka-tagh konnten wir nur vermutungsweise oben einige Bemerkungen machen. Auch der Weg, welchen Pjewtsof in 84½° von dem 4 240 m hoch gelegenen See Dashi-kul südwärts beinahe bis zum 36sten Breitengrad zurücklegte, gibt nur unsicheren Anhalt. Er verquerte dort auf einem 4 980 m hohen Pass in 36°20′ N eine Kette, welche nicht das Streichen der Randgebirge hat und südlich nach einer Hochfläche abfällt, in welcher wir nur die Höhenzahl 4 930 m finden. Während er sie östlich mit der Prjewalski-Kette verbindet, gibt ihr Bogdanowitsch die Richtung WNW—OSO. Sie fällt dann genau in die Fortsetzung der durch Bonvalot's und Littledale's Reisewege hindurch verlängerten Dungburé-Kette. Doch ist die Lücke zu gross, um die Schlussfolgerung mit einiger Sicherheit anzuwenden.»[1]

In his next chapter Richthofen describes the Tangla-system so far as it was known from HUC, PRSHEVALSKIY, KRISHNA, ROCKHILL, BONVALOT, LITTLEDALE, DUTREUIL DE RHINS, GRENARD and BOWER. He discusses the views of WEGENER and of LOCZY, who was the first to show the relation between the Indo-Chinese ranges and the Kwen-lun. And he arrives at the result:

»Wir dürfen demnach mit Sicherheit annehmen, dass die Bodenschwelle, über welche der Tangla-Pass führt, von 93° bis 88° O vorhanden ist, und es liegt die Möglichkeit vor, dass sie sich westlich bis über den 80sten Längengrad hinaus erstreckt. Soweit wir sie kennen, bewahrt sie einen auffallend gleichartigen Charakter. Sie ist nur eine flache Wölbung von geringer relativer, aber ungemein grosser absoluter Höhe, welche das Land Tshang-tang im Norden von dem eigentlichen Tibet im Süden scheidet . . . Es scheint, dass wir es mit einem sehr alten, in hohen Grade abgewittertem Gebirge zu thun haben. Vermutlich bestehen die aufragenden Teile aus den wiederstandsfähigeren Gesteinen.»[2]

Richthofen tries to bring order into the confusion which had long prevailed and still partly prevails regarding the rivers in the Nu-tshu region and the basin of Nagtshukha, and finally proceeds to the discussion of the mountains round the last-mentioned river. He says:

»Betrachten wir erst die Karte von Nain Sing's zweiter Reise nach Lhassa. Er fand damals (1874) an der Südostseite des Tengri-nor einen von SW z. W nach NO z. O streichenden Gebirgszug, den er (südöstlich vom Ostende des Sees) in den zu 5 150 m gemessenen, aber nur 450 m über dem Tengri-nor befindlichen Pass Dam-Lhargan-la überschritt. Zwei Jahre zuvor war er am Khalamba-Pass in 5 220 m über die südwestliche Fortsetzung derselben Kette gekommen, ohne diese als solche zu erkennen. Es ist daraus zu schliessen, dass sie dort nach der Richtung WSW schwenkt. Ihren Gipfel Nindjing-tangla schätzte er auf 23 600 Fuss (7 200 m), einen anderen auf 23 900 Fuss (7 300 m). Auf der Karte von A—K— ist der letztere Name für die ganze Kette angewandt. Die Bonvalot'sche Expedition kam auch über den Pass von Nain Sing. Er wird Col de Dam genannt und zu 5 600 m angegeben (der Tengri-nor zu 4 850 m).

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[1] China, Drittes Band, Herausgegeben von Ernst Tiessen, Berlin 1912, p. 353—355.
[2] Op. cit. p. 359.

Der nächste Besucher ist Littledale. Er überschritt das Gebirge im Süden des Südwest-Endes des Tengri-nor auf dem 6 000 m (19 587 Fuss) hohen Pass Goring-la und stieg südöstlich bis 5 160 m herab. Er war in der Gegend der von Nain Sing angegebenen höchsten Gipfel und fand das Gebirge stark vergletschert. Den Culminationspunkt nennt er Tsharemaru (D'Anville's Tchimouran); seine Höhe berechnete er zu 24 153 Fuss oder 7 366 m, was mit Nain Sing's Schätzung gut übereinstimmt. Der Name Nin-Chen-Tangla wird der Kette beigelegt und ihre Richtung WSW—ONO eingezeichnet, ihr Anblick als ungemein grossartig geschildert. Endlich kam noch Dutreuil de Rhins nach dem Pass Dam-Lhargan-la. Ein Gipfel im Osten desselben (Samdan-gangtsa) wird mit 6 860 m angegeben.»[1]

Regarding the Nien-chen-tang-la Richthofen has the following note:

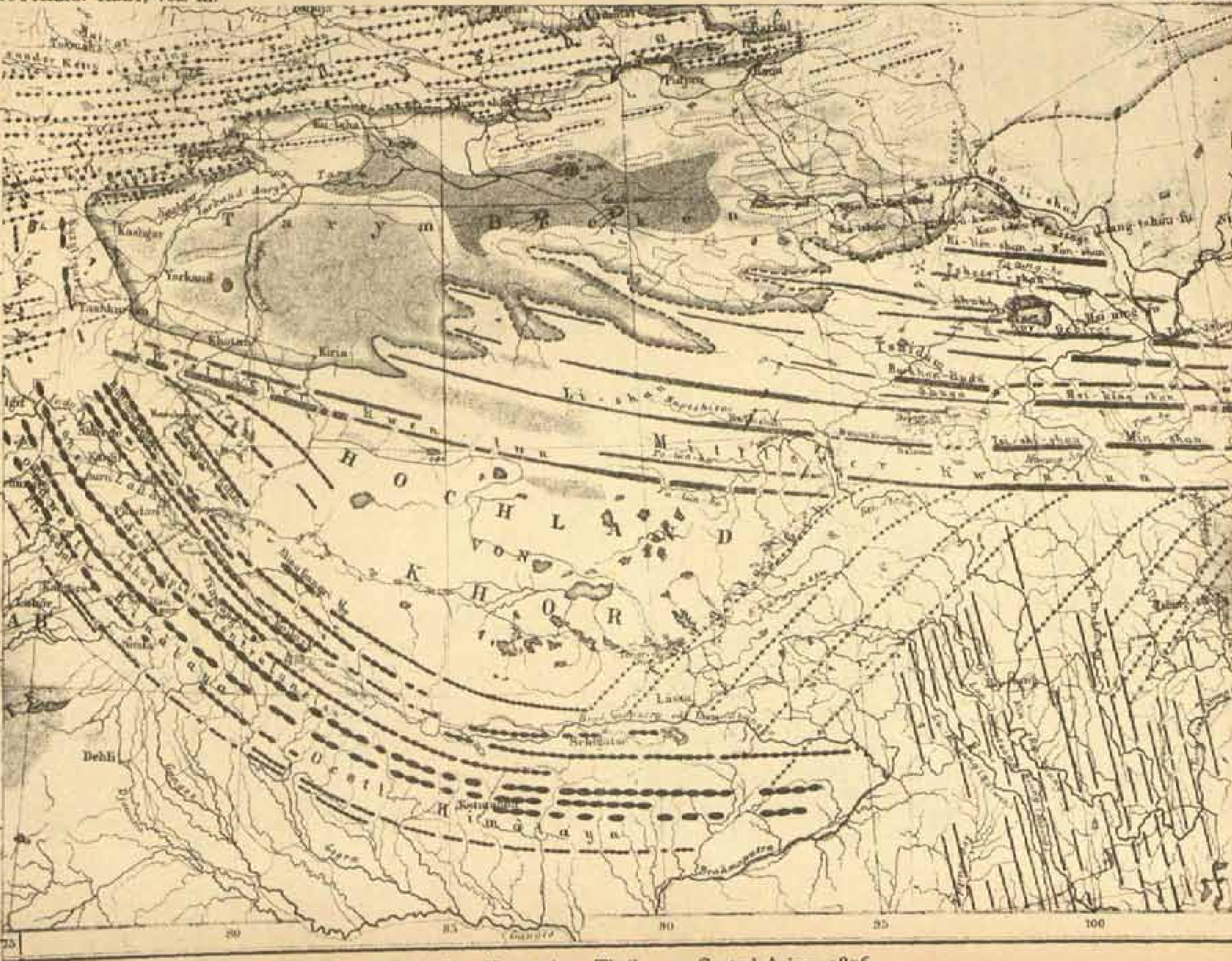
»Das Gebirge war schon früher bekannt. D'Anville zeichnete es als Tchimouran und Larkin ein. Seine nordöstliche Fortsetzung wird von dem Nag-tshu, dem Oberlauf des Kharaussu, von Norden nach Süden durchbrochen, und an dieser Stelle führt die Strasse von Lhassa nach Hsi-ning-fu hindurch, ganz wie es jetzt auf der Karte des Prinzen von Orléans dargestellt ist. Bei Klaproth finden wir sogar schon den Namen Nientsing-tangla-gangri für einen Gipfel, der aber NO von dem von Nain Sing liegt.»

From the above-mentioned material Richthofen arrives at the following interesting conclusion:

»Aus allen diesen Angaben können wir den sicheren Schluss ziehen, dass eine sehr hohe, stark vergletscherte Kette mit scharfgratigen Gipfeln in der Richtung WSW—ONO dem Südostufer des Tengri-nor parallel zieht und die Wasserscheide zwischen diesem und dem Strom von Lhassa bildet. Gegen Westen, wo sie von der Strasse von Shigatse nach dem Tengri-nor überschritten wird, scheint sie in eine mehr nach W geneigte Richtung umzubiegen und weiterhin die nördliche Wasserscheide des Jaru-dzangbo zu bilden. In ihrer nord-östlichen Fortsetzung, jenseits des relativ niedrigen Passes Dam-Lhargan-la, trägt sie auch noch eine Anzahl Schneegipfel, wird aber von dem Nagtshukha bei seiner Südwendung durchbrochen. Weiter kennen wir sie nicht; doch ist es wahrscheinlich, dass sie sich als Wasserscheide zwischen Nagtshukha und Ur-tshu fort erstreckt. Wo sie endet, lässt sich nicht ersehen. — Parallel mit dieser Haupt-Kette scheint im Süden eine zweite, minder hohe zu verlaufen, welche den Nagtshukha an der Südost-Seite begleitet und die Oberläufe der zum Ki-tshu sich sammelnden Gewässer so stark einzwängt, dass sie zu stark gekrümmten Durchbrüchen veranlasst und die Wege, statt ihnen zu folgen, auf hohe Pässe gedrängt werden. Zwischen den beiden Ketten, fliessen die Flüsse in Längsthälern. Unter den Gipfeln ist der Pohamolam zu nennen. Weiter südöstlich ist unbekanntes Gebiet. — Gehen wir von der Nindjing-tangla-Kette nordwestlich, so ist das Land auch hier orographisch unbekannt. Aus den vereinzelten Höhenzügen und Berggruppen, wie sie vom Nagtshukha und dem Tengri-nor bis weit nach Westen hin auf den Karten von Nain-Sing, Bower, Littledale und anderen dargestellt sind, lässt sich ein Bild nicht gewinnen. Dies kann einzig und allein durch geologische Untersuchung gestaltet werden. — Die Nachrichten über Gesteine sind ungemein beschränkt. Aber aus den wenigen Notizen lässt sich auch vom geologischen Standpunkt der Schluss ziehen, dass man im Süden des Tangla ein ganz verschieden gestaltetes Land betritt. Ein Blick auf die Liste der von Bonvalot gesammelten Gesteine zeigt den Contrast . . .»[2]

Thus Richthofen was, in 1896, of the opinion that two ranges existed north of the Tsangpo, the principal of them being a continuation of the Nien-chen-tang-la

[1] Op. cit. p. 371.
[2] Op. cit. p. 371, 372.



Richthofen: Karte eines Theils von Central-Asien, 1876.

Gen. Stab. Lit. Anst. Stockh.

and that the prolongation of this range to the N.E. was pierced by the Nak-chu river. In this incorrect view Richthofen may, to some extent, have been influenced by Saunders. It should be remembered that Richthofen regards the maps of Nain Sing, Bower, Littledale and others as insufficient for clearing up the orography of the parts of Tibet where these travellers have been. He could not be expected to have contributed in any more essential way to the problem of the Transhimalaya than Reclus, for both used the same material, although Richthofen digested it more thoroughly.

Pl. XXIV is a part of the map of Central Asia which accompanies Vol. I of Richthofen's China.[1] The ranges Richthofen places north of the upper Tsangpo he reckons to the Himalayan System. Those situated north of the lower part of the Tsangpo, from Shigatse and downwards, he reckons to the Sinian System. Between Kyaring-tso and Tsangpo he has only one range. Between Dangra-yum-tso and Tsangpo he has two. N.E. of the uppermost Tsangpo he has three ranges and N.E. of Manasarovar he has four; the one situated nearest to the lakes he calls Kailas, just as Burrard did some 30 years later. In the N.W. he has two Kara-korum Ranges, both very short. Probably he regards the Aling Gangri as the continuation of the southern one, though there is a great interruption between both, an interruption which certainly exists in reality. As to the 1, 2, 3, and 4 ranges north of the Tsangpo, this orography is of course only conjectural. S.W. of Tengri-nor the Sinian ranges come into contact with the Himalayan System and stretch to the N.E. in the same way as we saw on Saunders' map.

[1] Karte eines Theils von Central-Asien; China, Band I, p. 150, 1876.

CHAPTER XXV.

MODERN TRAVELLERS.

Richthofen, in his chapter on Tibet, mentions three modern travellers, of whom one reached the heights of Nien-chen-tang-la, one saw the system to the south of his route, and only the third crossed it in a new pass. These three travellers are BONVALOT with Prince HENRY OF ORLÉANS, DUTREUIL DE RHINS with GRENARD, and LITTLEDALE. All these expeditions approached Tengri-nor from the north. BONVALOT was, so far as is known, the first European to see the lake. I will enter here, in their own words, the descriptions of these three travellers' observations.

From the height of a last range BONVALOT became aware of the lake.[1]

»Lorsque nous arrivons au haut de la passe, nous apercevons le Ningling Tanla et l'extrémité orientale du lac. Nous gravissons d'un pas rapide les hauteurs voisines afin d'élargir notre horizon . . . Le Ningling Tanla attire plus longtemps nos regards. Cette chaîne développe devant nous son arête poudrée de neige et nous barre parfaitement l'horizon. On est surpris de la régularité — de l'altitude presque égale à l'œil — de cette suite de cimes surmontant des contreforts qui s'abaissent vers le lac, bien alignés comme le pourraient être les tentes d'une armée. Et juste au milieu, précisément au point où s'avance en grand'garde ce que nous supposons être un promontoire, si ce n'est une île, on voit dominer majestueusement tout cela, quatre grands pics de glace que les Tibétains révèrent, car derrière eux est Lhaça, la Ville des Esprits . . . En regardant le côté nord du lac, on ne voit pas de neige sur le chaînon qui le limite, tandis que les reliefs du Ningling Tanla sont blancs, et l'on constate la véracité du mot tibétain: 'L'eau du Namtso est faite de la neige du Ningling Tanla.' — A mesure qu'on avance vers le sud, le lac semble s'élargir et grandir aussi dans la direction du sud-ouest, et, comme la brume nous empêche de voir sa fin, il prend l'immensité d'une mer sans rivage. Mais, la brume évanouie, on voit bien que ce n'est qu'une petite mer, qu'un grand lac emprisonné dans les montagnes . . . Le temps de me demander si l'on a mis le Ningling Tanla à cette place pour nous empêcher de passer, et la nuit tombe.«

It was not to be the good fortune of the memorable French expedition to cross the range, for just here its progress was stopped by the Tibetans. But Bonvalot reached the very water-parting crest in the pass of Dam, the same as Nain Sing's Dam-largen-la, to which the French explorer gives 5 650 m (18 532 feet). To the east some high peaks could be seen, obviously belonging to the Nien-chen-tang-la,

[1] De Paris au Tonkin à travers le Tibet inconnu. Paris 1892. p. 260.

although Bonvalot says of it:[1] »Cette chaîne s'appellerait Samda Kansain, et la rivière au bord de laquelle nous nous trouvons, Samda Tchou, empruntant son nom à la montagne qui la nourrit.» This massive is the same as that which is called Sam tan gang tsa on the Ta-ch'ing map.

Bonvalot uses the name Ningling Tanla in his text, but the more correct form Nindjin Tangla on his map. Moreover he has, as it were, another higher range immediately south of it, with the legend: »Sommets très élevés (Dominant la chaîne)», which is not in accordance with other maps. The orography even of this eastern part of the system is, however, too little known to allow us to decide which view is the correct one. To represent the Chang Choung-la, or Shang-shung-la, as a meridional »grande chaîne neigeuse» can hardly be right, as the massive of Shang-shung must simply be the eastern continuation of the Nien-chen-tang-la.

At the end of 1893, or four years after Bonvalot, his countrymen DUTREUIL DE RHINS and F. GRENARD reached the same places at the eastern shore of Tengri-nor, after having taken a more westerly route and followed the northern shores of Chargut-tso and Selling-tso. Grenard describes the first view of the lake in the following words:[2]

»Enfin, le 30 novembre, du haut de la dernière côte, nous découvrîmes le lac du Ciel, le lac saint et vénéré, dont l'azur sombre et tranquille contrastait violemment avec la blancheur éclatante des montagnes aux mille pointes, comparables aux vagues d'une mer démontée, qui s'élevaient sur sa rive méridionale; et ces vagues, se dressant les unes sur les autres, paraissaient monter à l'assaut d'une masse prodigieuse qui surgissait au-dessus d'elles, toute noire, car les flancs en étaient tellement abrupts que la neige n'avait pas où se prendre, et la raideur, l'aspect sombre, l'énormité de cette masse avaient quelque chose de formidable.[3] Dans l'est se prolongeait bien au delà du lac la chaîne des pics neigeux, que dominait tous la lointaine et splendide pyramide du Sam-tan gang-tsa, le Glacier de la Contemplation. Cette montagne, qui, retirée au milieu de cette région presque morte, semblait ne point daigner voir ce bas-monde du haut de sa sérénité impossible et froide et vouloir de sa cime aiguë pénétrer et s'absorber dans le vide des cieux, était bien le visible symbole de l'âme bouddhique . . . Nous avions touché le but; mais nos hommes . . . éprouvaient un dégoût mêlé de stupéfaction à cette sorte d'acharnement des montagnes de glace à les poursuivre depuis trois mois, et pour nous, mieux informés, l'impression était saisissante de voir . . .»

At Zam-na, on the northern shore of Tengri-nor the French expedition was stopped by the Tibetans and had to wait some fifty days. Grenard says: »Si donc nous avions jugé nécessaire ou utile de continuer notre marche, rien n'eût été plus facile que de pénétrer jusqu'au village de Dam, de l'autre côté de la chaîne méridionale, et là même nous n'eussions été arrêtés que par le manque de vivres et la

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[1] Op. cit. p. 293.

[2] Mission Scientifique dans la Haute Asie, 1890—1895, Paris 1897, Vol. I, p. 221 et seq. The same description is reprinted in more popular form in: Le Tibet le pays et les habitants, Paris 1904, p. 64 et seq.

[3] This is mount Tcha-ri-mé-rou.

fatigue des animaux.» It is to be observed that he calls the range a meridional one, which can be right only for a very short portion of the Nien-chen-tang-la.

Regarding this range we are not informed of much beyond what was known from Bonvalot's journey.

»Tandis que Dutreuil de Rhins se dirigeait sur Nag-tchou par le chemin direct, je me mis en devoir d'accompagner le grand lama jusqu'au pied du Dam-La-rkang la. C'était là une légère faveur qui n'avait pas été obtenu sans peine ni sans risquer de remettre tout en question; mais nous y avions tenu enfin de pouvoir relier par un point, très précis notre itinéraire à celui de M. Bonvalot. Je campai le soir au point extrême atteint par ce dernier voyageur.»

Richthofen had the impression that Dam-largen-la was reached by Bonvalot. It is not, however, quite clear from the two French narratives whether the pass itself was reached, in which case a few words should have been said about the view to the S.E. At any rate both touched on the same route the Nian tsin tang ra as Grenard calls the range on his sketch map.[1]

The country crossed by ST. GEORGE R. LITTLEDALE in company with his wife and Mr. W. A. L. FLETCHER is very much like those parts of eastern Tibet which were crossed by Bonvalot, Dutreuil de Rhins and myself. Rockhill travelled through a more accentuated part further east. I will here give some extracts from Littledale's account as being characteristic for the plateau-land of eastern Tibet.[2]

He left Cherchen on April 12th 1895, went up the Cherchen-darya and then turned south near 87° East. long. He crossed the Tokus-davan and Arka-tagh, where a peak was measured to 25 339 feet, whereas the height of the Arka-tagh pass is not given. Then he finds himself on the »Tibetan plateau proper» which »has, in its northern part especially, a very small rainfall, and in the absence of rivers the drainage of the country finds its way into one or other of the innumerable lakes, which, having no outlet, are salt. Except in the volcanic country, the valleys are broad and open.» Regarding the orography he never saw, from Arka-tagh southwards »a single continuous mountain range till we came to the Ninchen-tangla, south of the Tengri-nor». But he saw unconnected successions of short ridges and peaks. A succession of rather low passes were crossed; in 35°40′ one had a height of 17 092 feet, in 35°10′ one had 17 201, another in 34°40′ 17 079, the next, in 34°35′ 17 176 and finally one in 34°30′ 17 473 feet. »Between 36°50′ and 33°50′ N. lat. our path lay through a very volcanic region, numerous undoubted volcanoes being visible. South of 33°50′ I did not notice any, till three months later we passed the conspicuous volcano Tongo.»

On June 26th, at lat. 33°12′ and long. 88°12′ he first came under the influence of the S.W. monsoon and in the same region met the first Tibetans. Then he crossed the following passes: at 33°50′ one of 19 348 feet, at 33°40′ one of 17 574, at 33°20′ another of 17 953 and a fourth of 17 021 feet. Between 33° N

[1] Op. cit. p. 215.
[2] Geographical Journal, May 1896, Vol. VII. p. 453 et seq.

and Selling-tso he had no pass reaching 17 000 feet. »We were everlastingly crossing from one lake basin to another, but as we got south the gradients became less steep than what we had met with further north.»

After Tchudun-tso near the N.W. corner of Nam-tso »we crossed», as Littledale says, »a low pass, and then came in sight of the Tengri-Nor, locally known by the name of Nam-Tso . . . On the south it was fringed by the magnificent range of the Ninchen-Tangla; — a succession of snow-clad peaks and glaciers, partially hidden in clouds of vapour, which added to their size and grandeur, while above all towered with cliffs of appalling steepness the great peak of Charemaru 24 153 feet . . .[1] In the Lama survey map of Tibet, published 1733, there is a mountain marked Chimuran, in very much the same position as Charemaru; the similarity of the names can hardly be accidental.»

»A deep rapid river» running into the lake from the W.S.W. was crossed. From here the way went up to the Goring La, 19 587 feet high. The road down to the south seems to have been difficult as he had to cross a glacier or »go down a glacier» full of crevasses. At 30°12'12" was the last camp.

It is curious that all travellers, from the Pundits to Littledale and DE LESDAIN have so very little to say of the Nien-chen-tang-la, and nothing at all of the Transhimalaya as a system. Not one of the travellers who have crossed or been in contact with this enormous mountain system has made the slightest attempt to make use of the poor material existing and draw out some general conclusions from it. Everything that has been done in this direction has been tried by geographers who have never been in the country, Ritter, Humboldt, Hodgson, Saunders, Markham, Reclus and Richthofen. Those who have not been in Tibet have been more far-sighted and perspicacious than the explorers themselves, who, from what they had seen with their own eyes ought to have had ampler occasion to generalize. But there is not a word of the sort in their narratives.

Littledale could, during his admirable expedition, have added a good deal, if he had not been in a hurry. For he says: »For the greater portion of the way from Zilling Tso to Ladak, our route lay to the south of that taken by Nain Sing, Captain Bower's, of course, being north of that again. We wished to have kept about 60 miles further south and traversed the Dokthol province, but feared being delayed had we done so.»

Littledale wisely felt that it was a *desideratum* of exploration to cross the »Dokthol» province which was quite unknown. But it had to remain unexplored for some twelve years more. I regard it as very doubtful whether Littledale, if he had tried, would have been allowed to march through what Nain Sing called Dokthol. At least I tried in vain to do so in 1901. Under no conditions would the Tibetans allow me to take the southern route.

[1] On Grenard's little sketch map the highest peak has 23 452 feet, obviously the same as Littledale's Charemaru.

Littledale had therefore to return north of Selling-tso, and even Chargut-tso was left south and could not be seen. Instead he saw some volcanic-looking mountains, one of which was a great dome-shaped mass of black lava. He also passed a good many abandoned gold-diggings, worked only in summer. The lake in which Bogtsang-tsangpo empties its water he calls Tuktsitukar-tso. This lake was called to me Dagtse-tso. When two different names are given to two different travellers, it is often impossible to tell which is the right one, or whether the object has in reality two names. Littledale crossed the Bogtsang-tsangpo some miles above its mouth and then kept north of the river the whole way. He passed Tonga and Gobrang on 86° long., and went north of Shakangsham and north of Lakor-tso. At 31°50′ and 84½° he has entered on his map the name Bomba, which may correspond to the name of the Bongba province. On October 10th he became aware of the snowy mass of Aling-gangri and finally reached Rudok and Shushel.

At Selling-tso my route is south of Littledale's. Near the mouth of Bogtsang-tsangpo our routes coincide, but along almost the whole course of this river I am a little south of him. Then again we coincide regarding Gobrang, from where I go south of Littledale, striking the Shakangsham nearer than he. Further on we coincide for a while again until Lakor-tso, where I go south of the lake, he north of it. Again we follow the same valleys till about 82°35′, from where he keeps far south of my route the whole way to Ladak, going south of Panggong-tso when I go north of that lake.

Between Panggong-tso and 82° I am north of Nain Sing; from there to the neighbourhood of Gobrang I am south of him. From Gobrang he strikes S.E. to Dangra-yum-tso. Gobrang, at about 86°, is a name I found as well as Littledale and Nain Sing, so this point makes a good control for the coincidence of all three routes. About the same place, somewhat to the south, Littledale has Nakchang, which is the same as the province of Naktsang. From near the southern shore of the Selling-tso and westwards, Littledale has a series of snowy ridges and peaks.

After Littledale had read his paper in the Royal Geographical Society, Sir CLEMENTS MARKHAM made the following interesting remarks, which were published, it should be remembered, in 1896.[1]

»I will say a few words respecting the chain of mountains which Mr. Littledale actually crossed, and which he mentions as throwing up peaks 20 000 feet high. I am sorry to say that on the map we have to-night that chain of mountains does not appear, which only shows how important it is that further exploration should be conducted in Tibet. I have called that range the northern range of the Himalayan system. I remember Mr. Trelawney Saunders was anxious to name it, and he has done so on a map he drew for me, the Gangri range, after the knot of peaks which connects it with the Karakorum; but Brian Hodgson has called it the Nyenchen-

[1] L. c. p. 482.

tang-la, as does also Mr. Littledale himself. These mountains are of the greatest possible importance and interest; they have only been crossed by native explorers and by Mr. Littledale opposite the Tengri-Nor, and in the whole length from Tengri-Nor to the Mariam-La pass no one has crossed them, so far as we know. One of the last suggestions by General Walker was that a rough survey should be undertaken of these northern parts of the Himalayan system, and I believe nothing in Asia is of greater geographical importance than the exploration of this range of mountains, which I trust geographers will agree to give some name to, and next time we have a map of Tibet in this room I shall take care that they are portrayed upon it.»

It is difficult to follow Sir Clements when he first says the absence from the map of the chain of mountains shows the importance of further exploration in Tibet, and afterwards promises that next time a map of Tibet is exhibited the chain shall be portrayed on it. For if the chain could be portrayed *sans façon*, the further exploration would be superfluous. But he is right in saying the mountains had never been crossed by anybody in the whole length from Tengri-nor to the Maryum-la, — and a mountain system which has been crossed by no one is *terra incognita*.

The following words of Sir Clements Markham: »nothing in Asia is of greater geographical importance than the exploration of this range of mountains», were strongly in my mind when I started on my last expedition. My original plan was to begin from the south, but circumstances forced me to turn round and enter the country from the north. But the great *terra incognita*, Transhimalaya, was always my goal.

To the same effect Sir Clements Markham expressed himself in his opening adress 1896 where he said:[1] »Pundit Krishna, advancing northwards from the valley of the Tsanpu, crossed the northern range of the Himalayas and reached the plateau by the pass called Khalamba-la, 17 200 feet above the sea. — It is to the desirability of completing the exploration of this mighty range (Nin chen Tang la), that I am anxious to turn the attention of geographers. — Although several intrepid travellers have crossed the Chang in various directions, a vast area still remains unknown, especially towards the north-west. But I think it is to the mountains which form its southern buttressing wall, and which rise from the valley of the Tsanpu or Brahmaputra, that the efforts of explorers should now be directed. The western portion of the northern Himalayan range is known as the Karakorum . . . The Tibetan continuation of the Karakorum, which is still almost unknown, commences at the famous central peak or knot called Kailas by the Hindus, and Gangri by the Tibetans . . . Continuing in an easterly direction, it forms the northern watershed of the Tsanpu or Brahmaputra. It appears to be a magnificent range of mountains . . . The name given to it by Mr Brian Hodgson is Nyenchen-tang-la, and the same name is referred by Pundit Krishna to one of its peaks. The only traveller who has

[1] Geographical Journal, July 1896, Vol. VIII, p. 6 et seq.

crossed the range is Pundit Krishna, when he traversed the Khalamba-la; but Mr. Littledale reached the Goring-la (19 587), which is more to the east. He speaks of the magnificent range of the Ninchen-Tangla, as a succession of snow-clad peaks and glaciers, partially hidden in clouds and vapour, which added to their size and grandeur, while above all towered, with cliffs of appalling steepness, the great peak of Charimaru, 24 153 feet high . . . This I believe to be the whole of the knowledge we now possess of this most interesting range of mountains. Commencing at the knot of Kailas, it forms the northern boundary of the Tsanpu valley to about the 90th meridian, and then turns north-east, so as to become the eastern boundary of the Chang, while on its eastern slopes are the headwaters of the three great rivers of Salwin, Mekong, and Yang-tsze.»

»The position of this northern Himalayan chain from Kailas to the Goring-la of Littledale, a distance of 600 miles, requires to be explored. It has once been crossed by the Khalamba pass, and a second pass was reached, but not crossed by Mr. Littledale. The Pundit Nain Sing traced the line of its peaks for 180 miles from a great distance, and Mr. Littledale gazed with admiration on the beautiful outline of a snowy ridge which shot up into the sky to a height of 24 153 feet, to the east of the Goring-la — the peak of Charimaru. This is the sum of our knowledge respecting this range of lofty mountains, which is alike the northern range of the Himalayan system and the southern buttressing range of the great Chang or Tibetan plateau, as the Kuen-lun is the northern buttressing range. A more accurate knowledge of its configuration is a great geographical desideratum. Its peaks along the hundreds of miles of its extent should be measured, its passes should be explored, the nature and extent of its glaciers ascertained, as well as its geological formation, and its relation to the great interior plateau. Here, then, is a piece of work which is well calculated to arouse the ambition of future explorers . . . Running in a north-easterly direction from the Charimaru Peak, the south-eastern scarp of Tibet, with the meridional chains which branch from it, offers an equally important field of work to the explorer.»

This mile-stone in the history of exploration in Transhimalaya is of great importance. Markham regards the Kara-korum and Transhimalaya as one and the same mountain fold a view which is to a certain extent correct. He again expresses the great desirability of exploration of this unknown part of Tibet. It is characteristic of the English standpoint that Hodgson is made responsible for the name Nienchen-tang-la, a name that is said, by Markham and others, to have been »given» by Hodgson. We have seen above that Hodgson has nothing whatever to do with the original appearance of this name, which was introduced by Klaproth from Chinese sources. Markham regards the Transhimalaya as a »range» just as all his predecessors, a mistake that must be forgiven as only a portion of the system was known. He says that Pundit Krishna was the only traveller who had crossed this range, which is also a mistake, for Nain Sing and Littledale had also crossed it in its east-

ern part and some native explorers far in the west. But twice in his address Markham says that Littledale did not cross the range, although he has given us the very important section of the Goring-la.

The address also shows what a false idea about an eastern buttress of the Chang-tang was still entertained so late as in 1896, Markham believing that Nien- chen-tang-la turned up to the N.E. and formed the threshold from which the Indo-Chinese rivers were supposed to begin. Saunders is responsible for this view, which again returns on the map illustrating the journey of A—K—.

But the great merit of Markham is to have understood and pointed out clearer than anybody else the importance of exploration in these regions. He returns over and over again to this great geographical *desideratum*, and for the sake of completeness I will quote two or three other utterances of his.

In 1899 he said:[1] »One of the most interesting pieces of geographical work that remains to be achieved in Central Asia, is the detailed examination of the great chain of mountains bounding the Tsanpu valley on the north. I have called it the *Northern Himalayan chain;* Mr. Brian Hodgson gave it the name of Nyen-chen-tangla, and Mr. Trelawney Saunders suggested the Gangri range; but no name has been adopted, and the mountains are practically unknown.»

In his address 1904 Markham again says:[2] »In my address of 1896 I drew attention to the importance of exploring the great northern range of the Himalaya from Kailas to the Goring-la of Littledale, and I got together all available information on the subject. But this is work which still remains to be done.»

A year later Sir Clements Markham said in his address:[3] »On the march from Gyangtse to Gartok, 40 000 square miles were surveyed, including the Tsang-po from Shigatse to its source, the Mansarowar lake region, and the Gartok branch of the Indus. For all this the chief credit is due to our Gold Medallist, Major Ryder. In my address for 1896, I drew special attention to the regions traversed by these officers, and to the importance of exploring the Tibetan continuation of the Karakorum range, which commences at the central peak of Kailas or Gangri, 21 800 feet above the sea. Mr. Brian Hodgson calls this Tibetan range Nyenchen-tangla. It rises from the northern bank of the Tsanpu, and Major Ryder has measured some of its peaks. He has much to tell us about this northern Himalayan range.»

It is always the same old story told I do not know how many times and as usual Hodgson is made responsible for Klaproth's Nien-chen-tang-la. No new information regarding the »range» is given in the address. In his address of 1896 Markham drew special attention not at all to the regions traversed by Ryder, but to the regions situated north of the Tsangpo valley. The latter achieved the most admirable and conscientious survey and triangulation along his road and so far as his

[1] Opening address, Geographical Journal, January 1899, Vol. XIII, p. 3.
[2] Geographical Journal, July 1904, Vol. XXIV, p. 6.
[3] Geographical Journal, July 1905, Vol. XXVI, p. 9.

and his fellow-travellers' eyes could reach to the north and south, but Markham's »Northern Himalayan range» still remained unknown and still, in 1905, was supposed to be a range, although in fact it consisted of at least ten different ranges.

Nobody has put this misunderstanding right in a more noble and generous way than Sir Clements Markham himself, when he wrote, after my second lecture in the Royal Geographical Society, February 1909:[1] »The so-called Nien-chen-tang-la mountains were unknown from the Tengri-nor to the Maryum-la pass, and I always looked upon their discovery, on those meridians, as the most important *desideratum* in Asiatic geography for many reasons.»

[1] Geographical Journal, April 1909, Vol. XXXIII, p. 416.

CHAPTER XXVI.

THE LATEST DISCUSSION ABOUT THE TRANSHIMALAYA.

It seems as if a supernatural mystery had kept the Transhimalaya under its spell. Even of those parts near Tengri-nor which have been crossed or visited by a few travellers extremely little is known. Of the passes which have been crossed we hardly know anything more than their names and their heights. Of the general orography extremely little has been reported, and of the geology nothing. Of the whole system, west of Khalamba-la nothing was known, except the edge, so far as it could be seen from the route of Nain Sing and Ryder and Rawling.

In another chapter, regarding the tributaries and source of the Tsangpo, and the sacred lake, I have dealt with Ryder's and Rawling's expedition and its beautiful results.[1] Let us now consider the parts of the publications of Ryder and Rawling which, directly or indirectly, have to do with the Transhimalaya.

RYDER fixed many peaks north and east of Lhasa »including some fine snow-peaks south of the Tengri-nor, mentioned by Mr. Littledale, the highest of which was 23 250 feet in height, and the highest peak we ever came across north of the Tsangpo. Two other snow-peaks which I fixed are, I believe, those mentioned by M. Bonvalot, and christened by him Mount Huc and Mount Gabet; but their heights were disappointing, the highest being 21 500 feet».[2] The following magnificent survey results were brought home: »Triangulation: An area of 45 000 square miles was completed, connecting Lhasa with India, and fixing all prominent peaks which were visible, with their heights. Topography: An area of 17 000 miles was surveyed on the scale of 4 miles to the inch, of which 3 000 square miles, in the neighbourhood of the Chumbi valley, Gyangtse, and Lhasa, were also surveyed on the scale of 2 miles to the inch. Route surveys, on the scale of 1 inch to the mile, were made of the road to Lhasa.»

It is obvious that such a far-reaching work should sweep the whole southern front of the Transhimalaya. And already the observation of Ryder that no high

[1] Vide Vol. II, p. 130 et seq. and 243 et seq.

[2] Major C. H. D. Ryder: »Exploration and survey with the Tibet frontier commission, and from Gyangtse to Simla viâ Gartok.» Geographical Journal, October 1905, Vol. XXVI, p. 369 et seq.

peaks, comparable with Mount Everest, were situated to the north, was of importance.

Captain WOOD of the same expedition says of the country to the north: »The valley of Raga Tsangpo is narrow, running almost due east and west, parallel to and about 30 miles to the north of the main river. Into this distance is crammed a tangled mass of hills, whose crests average about 18 500 feet, with several peaks of about 22 000 feet, covered with permanent snow.» At Ku-la, 16 700 feet, Wood found the headwaters of Raga-tsangpo, and Chour Dzong, my Chomo-uchong he calls a »snowy range, whose peaks range up to 21,000 feet». Wood ascended a peak north of Saka-dsong, 19 300 feet, from which he had »a fine view north up the valley of the Chata Tsangpo». This view could not, however, reach very far, as is shown on the map of the expedition. Finally, at Tradum, Ryder says: »From the hills to the north we had a fine view of a snowy range reaching an elevation of 23 200 feet.»

In Rawling's book[1] on his exploration in Tibet I cannot find a word about Transhimalaya, the Gangri Mountains, Nien-chen-tang-la, or whatever it may be called. This is not said in a critical mood, for I point out, that it is impossible to get an idea of a continuous and mighty mountain system from the road taken by the Tibet Frontier Commission. Therefore we find in Ryder's account only independent references to isolated peaks north of the Tsangpo, but no conception of an uninterrupted system, and in Rawling's account no reference at all to this most important geographical feature. It may seem surprising that the first scientific expedition which ever followed the southern front of Hodgson's Nyenchhen-thánglá, Saunders' Gangri Mountains and Markham's Northern Himalayan range, has nothing to tell about its existence or non-existence. But I regard it as a mark of conscientiousness of both Ryder and Rawling that they only describe what they have actually seen, without loosing themselves in theoretical discussions about theoretical mountain ranges.

Therefore Sir THOMAS HOLDICH is only partly right in saying that Ryder »has gone far towards answering several questions which arise when the northern water-parting — the great divide — between India and central Tibet is under discussion. It seems unlikely that he has established the position of that dividing line between the central lake region and the Brahmaputra basin, one of the most important geographical features in Asia . . .»[2] The first and second halves of this passage say the opposite thing and only the second half is right. For how should it be possible for whomsoever it may be to survey any part of a watershed, without crossing it. And how could Ryder be expected to have been in contact with a watershed of which the same author says, a few pages above in the same work,[3] and speaking of Little-

[1] The Great Plateau being an Account of Exploration in Central Tibet, 1903, and of the Gartok Expedition, 1904—1905. London 1905.

[2] Tibet the Mysterious, London 1904, p. 296

[3] Ibidem p. 285.

dale's route westwards: »The fact that no large rivers are crossed seems certainly to indicate that it is here, or near here, a little to the south, that the northern watershed of India is to be found.» When Holdich suggests that the great affluents to the Tsangpo must come from some of the innumerable lakes, the watershed should be situated north of these lakes, and as the Tibet Frontier Commission followed the Tsangpo valley it is hard to see how it could go far towards answering several questions in connection with this northern water-parting.

The following words of Sir Thomas are quite correct: »but intermediate to this long line of route through the central Chang (Littledale's) and that of the Brahmaputra River no traveller has yet contributed the necessary topography to enable us to decide with certainty. We can only conjecture that the basin of the great river extending from its banks to the main water-divide (wherever it may be) is warmer, more favourable to pasturage, more thickly populated by Dokpa herdsmen than any of the districts farther north.»

CHARLES A. SHERRING, in his book,[1] gives a good description of the Kailaş, but has not and cannot have anything to tell of the Transhimalayan system. His companion, Dr T. G. LONGSTAFF, made the following observation from an altitude of some 18 000 feet on the Gurla-mandata[2]: »This day (July 19th) the Himalaya of Nepal and Kumaon were hidden by the clouds, but the view towards the west was very impressive. Kamet (25 443 feet) stood out boldly over the Niti pass at a distance of 100 miles. North of this was the Gangri range, partially snowclad on its north-east slopes. Between lay a vast rolling plain with rounded snowless hills rising from it, and a bend of the infant Satlej winding away into the north-west on its way to the Arabian sea, while the waters of the Karnali at our feet were flowing towards the Bay of Bengal.»

GRAHAM SANDBERG is not far wrong when he says, in 1904: »Nearly all orographical features of Central Tibet and of Western Tibet appearing in maps have been laid down but tentatively. North-east of the Manasarowar lakes is a terra incognita of Western Tibet. The Littledales and Sven Hedin have skirted its northernmost line and did what they could in their respective forced rushes towards Ladak. The hurried observations along the tracks followed are most valuable; but speculation has had to do the rest.»[3]

The map accompanying Sandberg's book is very poor and incorrect. In those parts of Tibet which were unknown in 1904 the shortcomings must be excused. We find the »Noijin Tangla» abruptly cut off at about 88° E. North of it and just south of Nain Sing's lakes he has a long range from west to east, called Torgot Gangri, but there is no western prolongation at all of the Nien-chen-tang-la. He makes the

[1] Western Tibet and the British Borderland, etc. London 1906.

[2] »Notes on a journey through the Western Himalaya», Geographical Journal, February 1907, Vol. XXIX, p. 205.

[3] The Exploration of Tibet. Calcutta and London 1904.

Kara-korum, with the Kara-korum pass continue straight to the east to 85° E. and calls it »Snowy Range seen by Wellby». The map is too rough to be taken seriously.

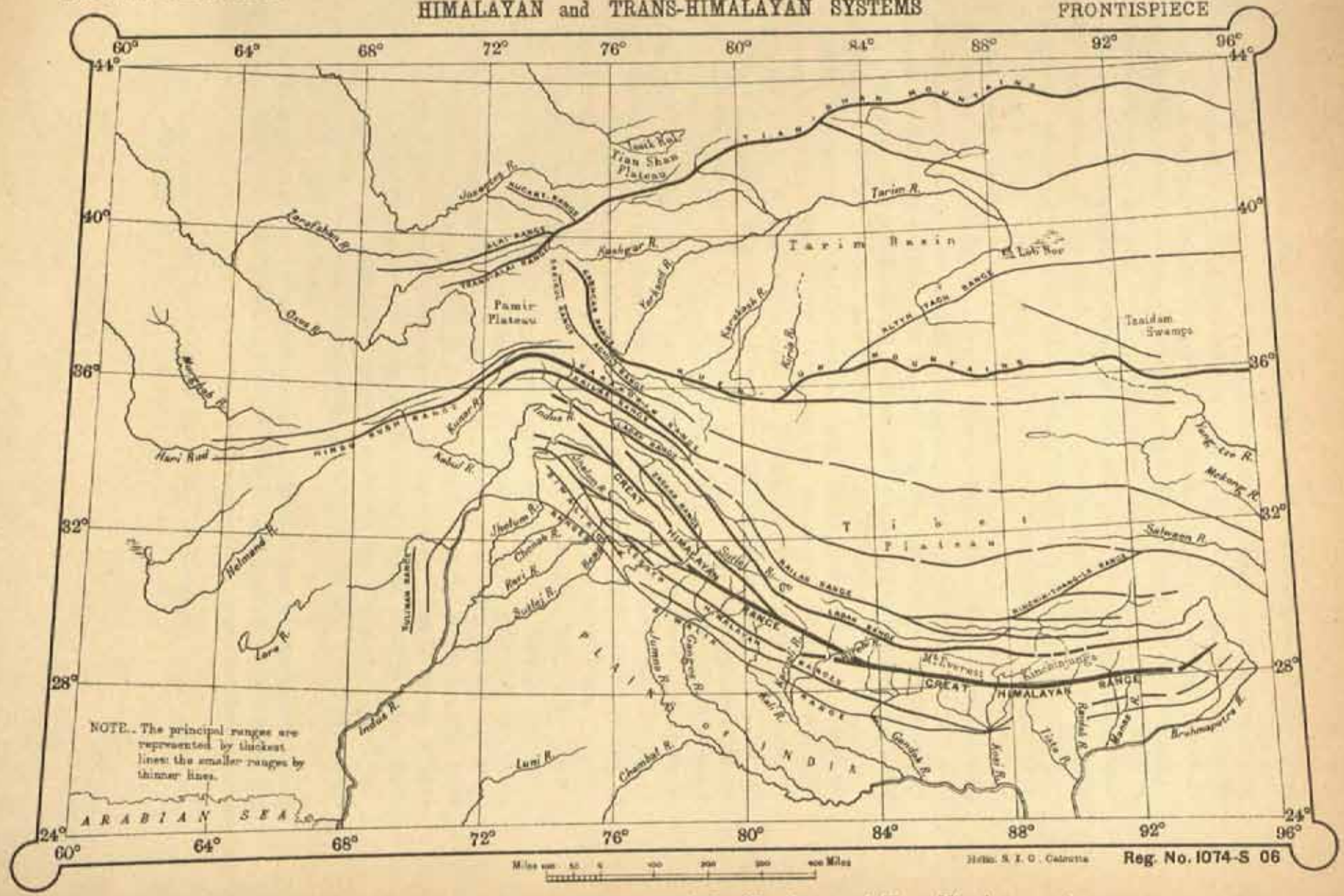
In another book[1] Graham Sandberg makes some references to our mountain system. Speaking of Tengri nor he says:[2] »Glacial drainage must furnish the bulk of the water-supply of this lake; for all travellers concur in noting the size and number of glaciers along the northern slopes of the Noijin T'angla.» He quotes Hooker and Godwin Austen[3] and comes to the conclusion that all the loftier ranges in Tibet are well stocked with enormous glaciers and snow-fields, several hundred feet thick. Old moraine and other signs of glacial action prove that the glaciers have formerly been very much larger than now. The present precipitation could not bring about such accumulations. Thus in »later centuries» the climate must have undergone a radical change and the present precipitation is infinitely less than formerly. He then draws the surprising conclusion: »However, so huge were these glaciers and other reservoirs of congealed water that, long as they have been furnishing the main demands of the great outflowing rivers, they are still large enough to maintain an adequate supply to them for an indefinite period to come.» The drying up lakes prove that the glaciers that feed them are dwindling. The fall of rain and snow in the north and west are insignificant. But in central Tibet a fair quantity of both occur, giving rise to such great rivers as Yeru Tsangpo and at least two other outflowing rivers, which thus, as he says, pass regions with abundant rain. But he admits that even nowadays the annual renewal of *nevée* is an appreciable factor. »Some fresh snow — though only a moderate quantity — is still added yearly to snow-field and peak and does not melt. Comparatively scanty moisture reaches Tibet in modern times.» Great rivers reach India and China from Tibet and still the amount of snow and rain-fall in Tibet »is certainly, by itself, totally inadequate to produce such an out-flow». He correctly points out that the monsoon makes itself felt to a certain appreciable extent throughout Tibet.

From the considerable volume of the northern tributaries to the Tsangpo Sandberg concludes that the northern watershed of this river must be set back many miles farther north than the actual valley line wherein the channel runs. He says it is a mistake to believe that »the massive mountain range, practically a continuation of Mount Kailas, known to geographers as the Gang-dis-ri range (really Gang Tise Ri) gives birth to these northern tributaries. This range passes eastward from forty to seventy miles north of the general line of our river, and in the main forms the southern watershed of the great lake plateau.» Now, he says, recent exploration shows that several of the northern feeders rise still further north than the Gang-dis-range, and even on the lake-plateau itself. But he omits to tell us which this recent ex-

[1] Tibet and the Tibetans. London 1906.
[2] Op. cit. p. 65.
[3] Ibidem p. 23.

CHART
to illustrate the TRENDS of the principal Mountain ranges of the HIMALAYAN and TRANS-HIMALAYAN SYSTEMS

FRONTISPIECE



Burrard's map showing the principal mountain ranges of the Himalayan and Trans-Himalayan systems, 1907.

GEN. STAB. LIT. ANST. STOCKH.

ploration is which has brought us such surprising news. When Sandberg says that the tributaries »pass through gorges between lofty peaks in this range, much as do the Indian rivers in their course through the southern Himalayas», he has obviously had Ryder's map before his eyes, from which map one may get the impression that a continuous range is following the Tsangpo-valley close by and that the tributaries pierce that range for reaching the Tsangpo. To the same effect points his assertion that the early course of the Chaktak-tsangpo »has been traced back north beyond the Gangdis-ri range, its primary sources being found in certain lakes to the SW and S of Dangra Yum T'so». The course of the Chaktak-tsangpo had not been traced back before 1908.

Sandberg has no doubt, to a certain extent, been influenced by Saunders' map, with which his description often agrees. Holdich proposed to remove the watershed to the north of the central lakes. On Ryder's map the great range was drawn very near the Tsangpo. I had the good fortune to remove the watershed to its real situation between the lake region and the river.

Finally I have to quote Colonel Sir S. G. BURRARD'S views regarding the Transhimalaya. On his Chart XVII[1] he has entered the Ninchin-thang-la range south of Tengri-nor to 89° E. long. The western prolongation is missing, but eastwards he has drawn its continuation far down between the Irrawaddi and Salwen. Of this part he says in the text:[2] »The southerly extension of the Ninchinthangla range shown on chart XVII is purely conjectural.» Compared with the general orographical laws prevailing in these parts of High Asia, Burrard's conjecture is very likely to be right. Burrard draws his conclusion from the river courses: »We have as yet no proof that the Ninchinthangla sweeps round on the east as the Kara-korum does on the west, but the courses of the rivers in the two regions are very similar.»

In Burrard's terminology the Kailas range is the western half of the Transhimalaya, whereas the eastern is Ninchin-thangla. Regarding its function as water-parting he says:[3] »East of Manasarowar the Kailas range forms generally the northern rim of the Brahmaputra's trough: it cannot, however, be called the water-parting, as it is cut through in places by rivers from the north.» If the Transhimalaya were really, as Burrard says, a range, this view would be correct. But in reality it consists of several different ranges, and some of the rivers stream between them, others cut through some of the secondary ranges nearest to the Tsangpo. The Transhimalaya, taken as an individual orographical system cannot be said to be cut through by any other river than the Indus.

The following view is not correct, at least not in the sense as represented on the frontispiece to Part I (Pl. XXV): »East of longitude 85° the Kailas range bifurcates, and

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[1] A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet, Calcutta 1907.
[2] Op. cit. Part II, p. 81.
[3] Op. cit. p. 95.

for nearly 150 miles the river Raga flows along the trough between the two branches.» For the range separating the Raga-tsangpo from the Tsangpo is not a continuation of the Kailas range proper, but of the quite independent Lunkar range, the highest part of which is Lunpo-gangri. North of Raga-tsangpo is the Kanchung-gangri and its eastern continuation. The ordinary parallelism prevails with some irregularities, but there is no bifurcation. »After throwing off its branch the main Kailas range runs eastwards with peaks of 20 000 feet. Trigonometrical observations show that it joins with a range of Tibet, known as the Ninchin-thangla, in longitude 88°. After this conjunction the Kailas range itself continues to trend in its former alignment as far as longitude 92° and possibly further. Nothing is known of the Kailas range east of 92° . . . From Manasarowar the Kailas range can be traced along the north bank of the Indus as far as the Panggong lakes. In longitude 80° it is intersected by the Singhgi, the eastern branch of the Indus . . . West of the junction of the Nubra and Shyok the Kailas range runs parallel to its northern neighbour the Karakorum; the long troughs occupied by the Biafo, Hispar and Chogo Lungma glaciers lie between the Kailas and Karakorum ranges.»

As I shall, later on, set forth my views regarding the relations between the Kara-korum and the Transhimalaya, the following passage in Burrard's work is of interest:[1] »The western termination of the Karakorum is the Hindu Kush, but of its eastern termination we know nothing. The peak of Aling Kangri, which stands in Tibet near the eastern source of the Indus, has been supposed to mark the continuation of the Karakorum fold, but chart XX illustrates our inability to draw the eastern section of the range. At Pangong and Rudok, between the known eastern extremity of the Karakorum and its supposed continuation at Aling Kangri, no range appears to exist, but our geographical knowledge of this region is very imperfect . . . East of Aling Kangri a great range was observed by the explorer Nain Singh. He left Leh in July 1874, and travelled due east from Rudok for a distance of more than 800 miles; an almost continuous range of snow mountains, he said, trended eastwards from Aling Kangri to the Ninchinthangla peaks.»

I have mentioned before that this observation of Nain Sing is not correct. No such range exists. The mountains Nain Sing could see to the south of his route conceal completely the view of the high Transhimalayan ranges.

»The Ninchinthangla range trends from north-east to south-west and forms a very striking exception to the east and west rule. The Ninchinthangla range forms the water-parting between the Brahmaputra and the closed basin of Tibet. Mr. and Mrs. Littledale crossed this range by the Goring pass (19587 feet), and the explorer Nain Singh crossed it by the Khalamba pass (17 200 feet).» Then Burrard quotes the passages of Littledale and Montgomerie which we already know. »In 1904 Major Ryder fixed several peaks of the Ninchinthangla range from the neighbourhood of

[1] Op. cit. p. 99.

Lhasa. R 217 was the highest peak he observed, and its altitude was 23 255 feet. It is unlikely that Montgomerie's or Littledale's peaks are higher than this. The Lani range is an easterly branch of the Ninchinthangla.» On his frontispiece map Burrard has sketched the hypothetical conjunction of the Kara-korum with the Nien-chen-tang-la. In this view, which we shall have to consider later on, I believe Burrard is right. But only under the condition that we should talk of systems and not of ranges, for a system consists of many ranges. Further, so far as I am aware, it is only one branch of the Kara-korum system which is in continuity with the Transhimalaya. On the other hand, the following view is not correct: »The Kyi or Lhasa river rises in the Ninchinthangla range, and forces a passage through the Kailas range.»[1] Burrard could not arrive at any other conclusion than this from Ryder's map, which is so far misleading as it gives the student the impression of one continuous range following close north of the Tsangpo and Raga-tsangpo.

And Ryder himself could not possibly get the impression of a continuous range north of the Tsangpo, for from his route the mountains are more like the edge of a high plateau, here and there crowned by peaks. Or, as Colonel Burrard wrote to me in 1910: »Ryder told me that what he saw north of the Tsangpo were the ends of separate spurs and no continuous range, and that he drew his map hastily and without any intention of conveying the idea of a range.»[2]

I have tried in the preceding chapters to set forth the theories and hypotheses of different geographers and travellers regarding the mountains north of the Tsangpo. I should not be complete if I left out my own views regarding them. I wrote about them in 1905 before Ryder's map had been published and a few months before I began the journey, the principal ambition of which was to discover the still unknown mountains north of the river. From my earlier expedition I had, as Nain Sing, got the impression that south of my route from Chargot-tso to Panggong-tso stretched a long mountain range. And I wrote of it:[3] »Probably it consists of a series of parallel ranges with a main range, which swells up here and there into higher elevations capped with perpetual snow and ice.» It seemed likely that Shakangsham, Tok-jalung and Aling-gangri could be considered as parts of this range. Concerning the Transhimalaya proper I wrote as follows:[4]

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[1] Op. cit. p. 156.

[2] After my journeys across the system Ryder at once accepted my description of it and wrote: »Until Sven Hedin has had time to work out his observations and plot his map, it would be adviseable to postpone any discussion as to the extension of this range east and west; but Sven Hedin has very thoroughly explored it throughout that region marked 'Unexplored', on the R. G. S:s map of Tibet, and there is no possible doubt that the range exists, and is the watershed between the Brahmaputra on the south and the lake region on the north.» Geographical Journal, December 1908, Vol. XXXII, p. 589. As the most important result of my last journey Ryder regards »the discovery of this very high and complicated mountain system».

[3] Scientific Results of a journey in Central Asia, 1899—1902, Vol. IV: Central and West Tibet, p. 578. Stockholm 1907. This volume was published in my absence.

[4] Ibidem p. 579.

»South of it[1] stretches a perfect *terra incognita*. Just as this last-mentioned range forms the northern boundary of Nain Sing's lacustrine basin and serves as a water-parting between it and the Selling-tso lakes, so we may take it that the Dangra-yum-tso and the groups of lakes to which it belongs are bounded on the south by an important main range running parallel with that on the north. And another big range overlooks, I believe, the northern bank of the Tsangpo. Between these two systems, of which there is not a sign on our maps, I assume that there exists a particularly broad and extensive latitudinal valley, which, I dare say, includes a vast number of lakes, amongst them being the Karmo-tso, Ruldap-tso, Galaring-tso, and Mun-tso, which have been located on the maps from hearsay. Between the last-named and the Dangra-yum-tso Nain Sing has drawn a big range, which he entitles the 'Targot Lha, Snowy Peaks'. This is undoubtedly a westward continuation of the great range of Ninchen-tang-la, which rises south of the Tengri-nor. To the southern-most range, namely that which overlooks the left bank of the Tsangpo, we may count the Kailas mountains north of the Manasarovar lakes.«

This is only a series of mistakes. And how could it be otherwise, considering that I was writing about an unknown country as Hodgson, Saunders and Markham! The only correct thing was about the system north of the central lakes, which was superficially known. But I committed a mistake, which from one point of view was even graver than that of Hodgson: I believed in the existence of two parallel ranges[2] where he had only one, and I thought they were separated from each other by a broad open valley, which I placed in the very regions where the highest mountains are in reality situated. I was misled by hypothetical lakes, which still remain mysterious. To combine Nain Sing's Targot Lha with Nien-chen-tang-la was also a very great mistake. And I believed, just as Burrard and HABENICHT did, that a continuous range followed the northern bank of the Tsangpo and that the Kailas was part of it.

I cannot omit the following passage, as it is of special interest, being a key to my last exploration and a link between my two last expeditions. It is also to be found on the last page of my work:[3]

»In the south the circumstances are different. The shape of Nain Sing's lakes alone suggests that the mountain-ranges are there built up with less regularity. They also lie closer together, are in general smaller, but at the same time much steeper, and abound in hard rock. Of this country we possess but the scantiest information, having no knowledge even of what its broad features are like. Within the very last year or two the extreme south of Tibet, i. e. the valley of the Tsangpo, has been reconnoitred by the members of the English expedition; but the whole of the extensive region between that valley and my route to Ladak is an absolute *terra incognita*, and it is just in this broad gap between the central plateau and the valley of the Tsangpo that the forms intermediate between the two are to be found. The investigator who

[1] The above mentioned range.
[2] Scientific Results, Vol. IV, Pl. 69, p. 580.
[3] Op. cit. p. 607, 608.

should therefore attempt to set forth the general architectural features of the Tibetan swelling would be certain to lose himself in this very gap in guesses and theories devoid of all foundation. Rather than expose myself to such a risk, I have resolved to study that unknown region with my own eyes on the spot. It is only when this gap has been filled up and the white patches on our maps have given place to new groups of lakes and new mountain-ranges and new rivers — it is only then that the attempt to convey a faithful picture of the morphology of the Tibetan highlands, and to get to the bottom of the genetic causes of the existing surface forms, can be successfully carried out; for it is only then that the necessary material will be available and the necessary general view of the whole, without which it is impossible to write a physico-geographical monograph of any value. Under these circumstances therefore I prefer to postpone giving a general account of the country until after my return from the journey upon which I am now just about to start. The work which I shall then hope to be able to write may be regarded as the immediate continuation and completion of this which I herewith bring to a close.»

I have quoted these words to show my own standpoint so late as in 1905, when all my predecessors had finished their work. About the time when I closed my manuscript, or in the beginning of the autumn 1905, the famous Khalamba-la was, however, crossed by the French traveller Count DE LESDAIN. [1] He had accomplished a remarkable and clever journey from Peking through Mongolia and Eastern Tibet and reached India *viâ* Sikkim. It is a pity that he crossed the Transhimalaya through the same pass, which had already once been taken by the Pundit of 1872. He did not add anything beyond what was already known from the Pundit's journey. The performance is very plucky and courageous, regarding all the difficulties he had to conquer. But it was not scientific and had no special object. On the map only 9 heights are given, and in the book the altitudes are very few. Several of those 9 heights have been determined by others. The morphological and orographical description is not clear, which is a great pity. De Lesdain's description of these gigantic mountains confirms what I have said before, namely that the narratives of all the eyewitnesses who have seen and crossed the Transhimalaya talk of it as if it were forbidden to enter upon any details. From Huc's narrative we must be satisfied with guesses; in Littledale's, Bonvalot's, Grenard's and the Pundits' we read only a few words or some poetical exclamations over the beauty of the Nien-chen-tang-la. De Lesdain does not even tell us which pass he has crossed, and it is only from his little sketch-map and from his description of Namling and Shang-chu, that we understand he has taken the road of Khalamba-la.

Count de Lesdain is surprised that he was not stopped by the Tibetans. In this respect he had the same experience as I. He travelled late in 1905, I reached Shigatse February 1907. It was obviously the Younghusband mission that made it easier both for de Lesdain and me to cross the country. Now it will probably be different.

His journey includes the period from Juli 1904 to November 1905. The route is situated to the west of Huc. Both in its northern part, in Mongolia, and

[1] Voyage au Thibet par la Mongolie, de Pékin aux Indes. Paris 1908.

in Tibet, he has chosen excellent and very little known portions of country. But as a rule it is difficult to follow him on more detailed maps. Only from September 8:th he gives us a possibility to fix approximately our whereabouts, for he says: »Le 8 septembre, nous étions sur les bords du lac Pou-tso, dont les abords très peuplés, moins cependant que le Nam-tso-nak, en conversation très amicale avec plusieurs Thibétains qui ne semblaient pas surpris de voir un sextant et un horizon artificial en position. L'un d'eux prétendit avoir assisté à une prise de latitude par un Européen arrêté par les autorités thibétaines un peu au sud du point où nous nous trouvions. D'après ces explications, ce devait être le docteur Sven Hedin.» During the last 8 days he had descended some 2 500 feet, and was now at a height of 4 500 metres. On the 9:th of September he left the place: »Directement au sud, nous croisâmes, après deux seuils, la vallée dans laquelle Sven Hedin fut arrêté et retenu quelques jours comme un prisonnier. Il doit y avoir en cet endroit un petit poste permanent de police....» As he did not follow the way going to Lhasa, and the first part of which I had taken in 1901, the guards had no objection to his passage. Further south he mentions labyrinths of small mountains and then the little lake To-ko-tso. In opposition to the maps he does not believe in any communication between To-ko-tso and the Pam-tso, which is south of it and 30 metres lower. Then he continued S. W. toward the central part of the northern shore of Tengri-nor, which he reached September 13:th.

The little map in de Lesdain's volume does not allow us to compare his route with mine, and I am not at all sure about the place where he believes he has crossed my route. My southernmost point where I was stopped by Kamba Bombo of Nakchu and where I stayed August 5—10, 1901, (my Camp LIII), is at 31° 46′ lat., and 90° 46′ long. Still, de Lesdain may be right in his supposition. Under such conditions the crossing is important so far as it gives us at least a preliminary and approximate possibility of combining the two routes on the map. The altitude does not agree, as he has 4 500 m. and I 4 845 m., mine being surer as observations were taken during several days.

This is what de Lesdain says of our system:[1]

»Le 13 septembre, comme le soir allait tomber nous découvrîmes le Tengri-nor s'étalant majestueusement devant nous. Un spectacle plus beau, plus magnifique ne se peut imaginer. Par derrière l'étendue de ses eaux d'un bleu profond apparaissait l'énorme chaîne des monts Nin-tchen-tang-la, longs d'une centaine de milles et perpétuellement couverts de glace. Les plus hauts sommets se reflètent dans la transparence calme du lac, et le pic dominant ne s'élève pas à moins de 25 000 pieds (7 300 mètres). Ces hauteurs incommensurables forment un cadre plus ambitieux qu'aucun lac de Suisse ne peut se vanter de posséder . . . Une dizaine de jours de marche nous séparaient encore des bords du Brahmapoutra, cette grande artère du Thibet du sud. D'après l'aspect général de la contrée et les renseignements des indigènes, il n'était pas possible, surtout dans nos conditions d'épuisement, de nous diriger vers le grand fleuve en suivant une ligne droite. Des massifs de montagnes très durs et absolument enchevêtrés for-

[1] Op. cit. p. 334 et seq.

maient un obstacle insurmontable. En conséquence, je résolus de suivre le premier cours d'eau dont la direction ferait présumer qu'il se dirigeait vers le Brahmapoutra. — C'est ainsi que nous cheminâmes plusieurs jours en suivant les bords d'une rivière sans cesse grossissante appelée 'Chang-Chu' que des Européens voyaient pour la première fois . . .»[1]

This is all we are told of this remarkable crossing, the last before I had the good fortune to cross seven hitherto unknown passes in the Transhimalaya and one which was known before.

The first communication of my Transhimalayan discoveries I sent from Simla to the Royal Geographical Society. It was a photograph of a very rough sketch-map which I had drawn to illustrate my lecture at Viceregal Lodge, September 24th, 1908. It was never meant to give anything else than an idea of where I had been, and to show the principal ranges which constitute the central Transhimalaya. In a note to the map I said:[2] »Of course, you will easily understand that the whole east and west parts of the Transhimalaya were known before, but one third of the range, or rather system, situated exactly where you have the word 'Unexplored' on the Society's map of Tibet, is absolutely new, and I have been able to show very clearly that the whole lot is one single system.»

It was too generous to say that the whole east and west parts were *known* before. They had been crossed by a few pioneers and we possessed a few sections with long distances between them. But the orography and geology of the mountains remained extremely little known, and so is the case to the present day.

As to the Central Transhimalaya it was absolutely unknown. A part of it had been skirted by Nain Sing in the north, its southern flank had been followed by Ryder's and Rawling's memorable expedition. Between the routes of these two expeditions the *terra incognita* was situated, and I went out to fill up the blanks so far as my forces allowed.

[1] George Bogle had seen it in 1774.
[2] Geographical Journal, November 1908, Vol. XXXII, p. 527.

CHAPTER XXVII.

THE NAME OF THE MOUNTAINS NORTH OF THE TSANGPO.

Ever since the old Capuchin Missionaries were speaking of the *Montes nivosi* they had seen to the north from Kamba-la, there has been much confusion about which name should be given to the mountains situated immediately north of the Tsangpo-*Montes nivosi* could be regarded as a literal translation of the Tibetan *Gangri* or *Mountains of eternal snow* and this name has for a long time been popular.

Then came d'Anville's map of 1733 with a series of different names for different sections of the system, namely from east to west: Youc M, Larkin M, Tchimouran M, Coïran MM, Tancla M, Tarcou MM, Tchompa M, Roncla M, Tomdson M, Lop M, Pancla M, Tachial radsong M, Kel M, Samia M, Kialtchou onclou M, Poupou taclac M, Tintang M, Toulsatelou M, Tchour M, Dsoumoukion M, Soureng M, Mouron M, Yala M, Tacra concla M, Kentaisse M, Patchon M, Latatsi MM, and others. None of these names, except perhaps Tchimouran and Coïran, and, of course, Kentaisse, have enjoyed any sort of popularity. Most of them are even now impossible to identify with any degree of certainty.

In the preceding chapters we have made acquaintance with all the other names which, at different epochs, have been more or less *en vogue*. Such names are Dzang, Zzang, Ninchen-tangla, Gang-dis-ri, Gangri and Kailas. Klaproth acquainted Europe with the names Gang-dis-ri, Dzang and Nien-tsin-tangla-gangri, which were adopted by Ritter. Humboldt wrote Zzang. Du Halde calls Western Transhimalaya Kan-te-chan, probably a corruption of Kentaisse, itself a corruption of Kailasa.

English geographers never mention the names introduced by the great German scholars. Markham says:[1] »The great Northern Chain of the Himálayan system, called the Karakorum Range in its western section, is here (at Tengri-nor) known as the Ninjinthangla or Nyenchhen-tang-la Mountains . . . To the westward it commences at the famous central peak or knot called Kailas . . . The name given to the eastern section of this most northern of the ranges by Mr. Brian Hodgson is Nyenchhen-tang-la; and the same name is referred by the explorer of 1872 to one of the peaks. Mr. Trelawney Saunders has proposed as the name of this range,

[1] Narratives of the Missions of George Bogle etc. London 1879, second edition, p. XXIV.

Gang-ri, the Tibetan for 'snowy mountain', by which the Kailas Peak is known in Tibet. But perhaps the most convenient way of distinguishing this important but almost unknown mountain chain will be by referring to it as the inner or northern chain of the Himálayan system.»

We have seen that Markham has pointed out on several occasions the desirability of adopting a name for the whole system. The same wish is expressed by Reclus in the following words: [1]

»Quel nom choisir parmi les appellations diverses? Faut-il laisser à cette chaîne tibétaine, ainsi que le font les frères Schlagintweit, le nom turc de Karakoroum, appartenant plus spécialement à l'arête qui sépare le Kachmir de la haute vallée du Yarkand-daria? Serait-il préférable, ainsi que le propose Hodgson, de l'appeler Nindjintang la, comme le pic superbe du Tengri nor? Mais cette homonymie n'introduit-elle pas une confusion inutile dans la nomenclature du Tibet? De même, ne convient-il pas d'écarter le nom tibétain de Gangri ou 'Montagne Neigeuse' que l'on emploie déjà pour divers sommets du Tibet occidental? Klaproth a proposé l'appellation de Gang-dis-ri, adoptée par Markham, tandis que Petermann et d'autres géographes nomment simplement les chaînes et les massifs situés au sud du plateau 'Montagnes de Tsang', d'après la province tibétaine qu'ils défendent des vents du nord.»

Thus Reclus relates the different names but does not propose which of them should be preferred.

I had crossed the mountain north of the Tsangpo seven times and only the last pass Surnge-la was left when I came to think of the name Transhimalaya. Only when I had the whole system clear before my eyes and on my maps did I understand that this name would be the most suitable one. After my first crossings I used to call it Nien-chen-tang-la in my diaries. By and by I found that there was not *one* range as the geographers had believed, but many and thus the name Nien-chen-tang-la would be absurd. So I applied to every new range a new name, either taken from a pass or a lake, for the natives had no general names for the ranges. But finally I thought it necessary to give a general name to the whole system, including all these ranges.

Would the Tsang Mountains do? No, for the system touches many other provinces and not only Tsang. Nor would the Gangri Mountains do, for I knew a Targo-gangri, a Lunpo-gangri, a Kubi-gangri, etc., but no Gangri. And I had never heard this word used alone as a name, even not at the Kailas, which is only called Kang-rinpoche. Nor would I under any conditions use the name Kailas. For Kailas is a peak on the southern side of one of the ranges and it would be absurd to include the Lunkar range, Lapchung range or Kanchung range under a name given by Hindus to a sacred peak in the west. Already Lassen found that this name gave rise to confusion as it was used for many peaks in the Himalaya. [2]

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[1] Nouvelle Geographie Universelle, VII, p. 35.

[2] »Der Name Kailâsa wird auf mehrere Theile des Himâlaja ausgedehnt, was wahrscheinlich Missverständniss und jedenfalls verwirrend ist . . .» Indische Alterthumskunde, Band I, Leipzig 1867, p. 42.

The name Transhimalaya, on the other hand, could not possibly give rise to any misunderstanding. The name caused a good deal of objection in England and India. What was Trans-Himalaya from the Indian side would be Cis-Himalaya from the Russian side! But in 1856 Hodgson had used the expression Transhimalayan regions and nobody had proposed to call them Cis-himalayan out of consideration for the Russians!

Major LENOX-CONYNGHAM made the following objection:[1] »The name, as Dr. Sven Hedin has mentioned, has been used before. It was applied in 1847 by Sir Alexander Cunningham, to a range which lies to the south of Ladak. It is no longer in use, but to resuscitate an old name and apply it to a new locality is to sow a seed of future confusion.»

Of his Trans-Himálayan Range Cunningham says:[2] »It branches off from the Gangri mountain to the south of Garo, and extends in one unbroken chain through the districts of Chumurti, Rukchu, and Zanskar, to the junction of the Zanskar river . . . From this it extends to the junction of the Drás river with the Indus . . . Its general direction is from south-east to north-west, and its extreme length is upwards of 350 miles. It forms the natural boundary between Ladák, Balti, and Rongdo on the north, and Rukchu, Zanskar, Purik, Drás, and Astor, on the south.»

If Cunningham's Trans-Himalayan range had ever been accepted, my proposal would, perhaps, have caused no end of trouble. If it had still been used, or even known by the majority of geographers, I should never have proposed it. Major Lenox-Conyngham gives, at the same place, the following extract of a letter from Colonel Burrard: »I trust that Dr. Sven Hedin will not think that the objections raised to the name Trans-Himalaya are frivolous or obstructive. I can assure him that they are considered weighty by men who have devoted their lives to the study of geography and geology, and who wish to avoid all risks of future inconvenience and controversy.»

Nor did I wish to cause any risk of future inconvenience and controversy. The geology is no hindrance for the name, at least not in those parts where I have made my researches. On the contrary, as will be shown in the geological part (Vol. V) of this work, written be Professor ANDERS HENNIG. More important is, that the TransHimalayan Range of Cunningham does not exist in reality. His Trans-Himalaya starts from Kailas, is situated between Indus and Satlej and cut through by the Dras river. There is no such range as may be clearly seen from Burrard's frontispiece map (Pl. XXV). Cunningham's Trans-Himalaya is a *mixtum compositum* of Burrard's Kailas range, Ladak range and Zanskar range. This fact alone is sufficient for abolishing for ever all talk of »a seed of future confusion».

The parts of the mountainous world of Asia, where Cunningham has his Trans-Himalaya belong to the Himalayan system. This fact is probably the cause why the name was not accepted, for a Trans-Himalaya should, of course, be situated beyond the great Himalaya.

[1] Geographical Journal, April 1909, Vol. XXXIII, p. 428.
[2] Ladák etc., London 1854, p. 52

Regarding the combination Trans-Himalaya Cunningham is not the first to use it. It had already been used by BERGHAUS in his *Geographisches Memoir zur Erklärung und Erläuterung der Spezial-Karte von Himalaya.* [1] Speaking of Hearsay's survey of the regions *within* the Himalaya, he says its resemblance with the survey which Webb carried out four years later of the same region is so great, that »man allen Grund zu der Vermuthung hat, die Darstellung der Trans-Himalaya-Gegenden sei eben so zuverlässig . . .» Thus the signification Trans-Himalaya for the regions north of Himalaya was used in Germany more than 10 years before the introduction of the name by Cunningham. The difference between him and Berghaus is that the latter applies the name to the regions where it is at home and where it has a *raison d'être.* But even Berghaus was not the first to introduce the expression. He got it from English geographers and explorers. Already in 1820 it was used by J. B. FRASER who has the following passage: »In all the routes of which we have accounts that proceed in various directions towards the Trans-Himālāyan countries, hills covered with snow are occasionally mentioned as occurring, even after the great deserts are passed and the grazing country entered. The breadth, then, of this crest of snow-clad rock itself cannot fairly be estimated at less than from seventy to eighty miles.» [2] The expression Trans-Himalaya may even be said to have very old roots. Take Ptolemy's map (Vol. I, Pl. III), or take DIÈGO RIBERO's map of 1529, where, across the upper parts of the Ganges-branches we read: *Scithia extra Imaū mōtē* or Scythia beyond the Imaus mountains, which is in reality the same as »Trans-Himalaya». *Extra* and *intra* are used instead of *trans* and *cis.* Extra Imaum montem is equivalent to Transimaus or Transhimalaya, though the first is applied to a region, the latter to a mountain system. The expression used by geographers of the antiquity was, geographically, perfectly correct. The case is the same with the expression Transhimalaya. [3]

ELISÉE RECLUS invented another Trans-Himalaya and places it as follows: [4] »Une autre arète de croupes et de sommets, que l'on pourrait désigner par le nom de 'Trans-Himalaya', se développe entre les monts de Tsang ou Gang-dis-ri et les pics étincelants de l'Himalaya et des deux côtés épanche des glaciers.» But this range, with the water-parting, is also a part of Himalaya itself, whereas the word »Trans» hopelessly separates it from the system to which it naturally belongs. So far as I know the proposal was never successful. [5]

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[1] N:o 10 von Berghaus' Atlas von Asia, Gotha 1836, p. 42.

[2] Journal of a Tour through part of the Snowy Range of the Himālā Mountains . . . London 1820, p. 282.

[3] Compare: Justus Perthes' »Atlas Antiquus. Taschen-Atlas der alten Welt» von Dr. Alb. von Kampen, Gotha 1898, Tab. I, where we read the name: *Scythia trans Imaum.* This expression, or rather the two last words, is *exactly* the same as my name *Transhimalaya*, though the latter is only applied to a mountain system.

[4] Nouvelle Géographie Universelle, VII. Paris 1842, p. 36.

[5] Dutreuil de Rhins has adopted the name, in the same sense as Reclus, as for instance: »On remarquera que la frontière du Thibet et du Népaul suit à peu près le Trans-Himalaya entre la région

The most interesting of the predecessors to my Transhimalaya is, however, the one introduced by Colonel GODWIN-AUSTEN in 1883. He says that the old and new observations »have, when considered in conjunction with the ascertained strike of the granitoid or gneissic rocks, led me to separate the great Central Asian Chain into the following five principal divisions, with some minor subdivisions: 1) The main axis or Central Asian, Kuenlun. 2) Trans-Himalaya. 3) Himalaya. 4) Outer or Lower Himalaya. 5) Sub-Himalaya.» [1]

It is not quite clear where he places his Trans-Himalaya. But of the Shayok-Kailas he says: »This subsidiary axis is well marked on the south of the Pangkong Lake north-west and south-east of Tanksé, running parallel to the Ladak range . . . To the eastward from Sajam Peak, the north side of the Indus and Gartangchu to the Kailas Peak, thence very probably north of the head-waters of the Brahmaputra.»

At another place [2] Godwin-Austen, dealing with the same subject, has also published an illustrating map to his lecture (Pl. XXVI). On this map we read the name Trans Himalaya at a place where a part of the actual Transhimalaya is in reality situated. That is to say, Godwin-Austen's Trans-Himalaya, situated between 83° and 85° of longitude, and N.E. of the river, covers only a small part of my Transhimalaya. The same map alludes to Saunders' Gangri by a dotted line, showing that Godwin-Austen regards this range as problematic.

We have seen that Cunningham and Reclus tried to introduce the name Trans-Himalaya by giving it to different northern Himalayan ranges. When it appears a third time, under the strong authority of Godwin-Austen, it has been placed in the only region of Tibet where one can speak at all of a Trans-Himalaya, namely north of the great valley which, in almost the whole of its length, must be regarded as the northern boundary of the Himalayan system. In this connection it is not necessary to enter upon Godwin-Austen's views regarding the different ranges as he has shown them by help of red lines. But if I understand his map rightly he includes one or two ranges south of the Tsangpo in his Trans-Himalaya, a view that diminishes the value of his use of the name.

In his text to this map Godwin-Austen discusses Saunders' different ranges. Talking of the »high range north of the Manasarowar Lake», which from there is »continued east as a range north of, and parallel with the Sangpo», he adds: »It is un-

des sources du Tsan po (mont Kouboun) et les monts Bouriamsoum, à 140 li (31 milles) à l'ouest de Tchirong.» L'Asie Centrale, p. 533. At another place he says that all the sources of the Ganges, which traverse the Himalayan region, as well as the Arun, the Lopra chu and the Subansiri, spring from the great Tibetan chain, called Trans-Himalaya, »qui, au nord et parallèlement aux monts Himalaya proprement dits, longe sans interruption la rive droite du Tsan po jusqu'à sa source.» Ibidem p. 182.

[1] Paper on the Himalayan Ranges etc. read before the British Association in 1883. Proceedings R. G. S. Vol. V. 1883, p. 610 et seq.

[2] »The Mountain Systems of the Himalaya and neighbouring Ranges of India.» Proceedings R. G. S. Vol. VI. 1884, p. 83 et seq.

The Trans Himalaya of Godwin-Austen, 1884.

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necessary to define it further, for the topography does not exist from which we can lay down such lines . . .» And in the same article Godwin-Austen says: »I leave it to future travellers and those who know the country to work out this subject yet further and with greater exactness, and after a closer examination of the country than I was ever able to give to it; and I leave it especially to those who may have the good fortune to visit the middle and eastern portions of the Himalayas and that great *terra incognita* beyond.» Here again the *terra incognita* is the region of Transhimalaya.

Already before I returned home Major RYDER wrote in an article about my expedition:[1] »It was here (at Buptsang-tsangpo) that the name Trans-Himalaya struck him as most suitable for this range. Although Tibetan names are obtainable for every conspicuous peak in this range, the Tibetans have no name for the whole range, and I therefore think the name proposed by Sven Hedin should be accepted.»

In the discussion after my second lecture in the Royal Geographical Society[2] Sir HENRY TROTTER said that I had given the name I proposed »most appropriately», even if the Russians would have called it Cis-Himalaya. Sir CLEMENTS MARKHAM said: »I think that his name of Trans-Himalaya is the best and most convenient that could be adopted.» Sir THOMAS HOLDICH does not like the term Trans-Himalaya for several reasons. The expression is too old and too obvious to be printed on the map. »Why not put it in English — Beyond the Himalayas»! He proposes the name Bongba mountains, for if we called the system by that name, »we should know what we mean . . . which we certainly shall not know if we talk of Trans-Himalayas». So when Sir Thomas Holdich in *Tibet the Mysterious*[3] says of the Kailas: »From its immense bulk and height it is probably one of the most impressive amongst Trans-Himalayan peaks . . .» we should not know what he means! Which, on the other hand, would be the case if we called it a peak on the Bongba mountains, although Kailas is not situated in the Bongba province, but anyhow *trans* Himalaya.

Colonel GODWIN-AUSTEN said: »Here (near Aling-gangri), these lines laid down by me as Trans-Himalaya are hypothetical; all deductions, made without personal observation of the country, partake of that nature. In the map and sections of 1884, the Ladak range, and all I grouped with it at that time as Trans-Himalaya, I took great care to lay down in dotted lines eastward of lat. 32° and lat. 80°.» I am sorry I did not know, when I delivered my lecture, that Colonel Godwin-Austen had already 25 years before me proposed the name Trans-Himalaya, but it is with great pleasure that I now give him the entire honour of being the father of that name — at its right place. It is curious that his proposal did not meet with any objection, — nor with any approval, I am afraid!

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[1] Geographical Journal, December 1908, Vol. XXXII, p. 589.
[2] Geographical Journal, April 1909, Vol. XXXIII, p. 416 et seq.
[3] P. 263.

Sir MARTIN CONWAY accepted the name I proposed and added some very wise words, which may serve as a splendid text to the many home-made maps of these regions: »It is hardly necessary to say that no study-drawn outline of imagined mountains ever approximates to the actual facts of mountain-contour which an explorer reveals . . . To discuss, therefore, the relative inaccuracies in this or the other sketched in approximation to what different geographers have believed might more or less vaguely represent the actual form of an unexplored range is to waste time. The man who actually traversed previously untraversed ground, is the first to replace deductions and hypotheses by actual knowledge, and thence forward his information becomes the starting-point for all future developments in knowledge.»

Captain CECIL RAWLING, the chief of the Gartok expedition, expressed the following opinion: »Personally, I do not like the term Trans-Himalaya, for by rights this belongs to the range lying immediately to the north of the Himalayas, and between that range and the Brahmaputra. Foreign names and duplication of names are, if possible, to be avoided. May I suggest such a one as Peu Kangri or the Snow mountains of Tibet, or Peu Lho Kangri, a free translation of the Snow mountains of Southern Tibet. Kailas range, the name suggested by Colonel Burrard, is good for that particular range in which Kailas is situated, but, as Dr. Sven Hedin has demonstrated, this is only one of similar ranges, and therefore it hardly seems quite appropriate for the whole system.»

Rawling is not quite correct when he says that I »proved that the range surveyed by Ryder, which runs parallel to, and distant 50 miles from, the north bank of the Brahmaputra, is not surpassed in altitude by any range of mountains right up to the Kwen Luen». For there is no such range. There are several ranges more or less parallel to the Tsangpo. Even on Ryder's map there is no such range, at least not 50 miles north of the Tsangpo. Only at one place is it 50 miles distant, namely at Amchok-tso, but there the Raga-tsangpo comes in between. At another place it is only 3 miles from the Tsangpo. If such a range existed I should have been happy to support the name Rawling proposes, namely the Ryder mountains.

From what Dr. T. G. LONGSTAFF saw when he climbed Gurla-mandata he got the impression that »if any range is to be called Trans-Himalaya, it should be» the one Cunningham called so. He finds Himalayan nomenclature already too complicated for introducing the name Trans-Himalaya, in which I cannot agree as the word *trans*, as Holdich remarks, places the system beyond the Himalaya and altogether outside of it. The fact that the expression has been proposed three times before does not complicate the question as these proposals were never accepted and nobody remembers them. If »it was to obviate any further extension of the name that Burrard and Hayden labelled the whole of this range the Ladak range, and applied the name Kailas range to that system still further to the north and across the Indus-Brahmaputra trough», it should be remembered, however, that the name

Kailás range was first introduced by Sir Alex. Cunningham in 1847, although he attached it only to the western portion of the system,[1] — further that it would be as absurd to call the whole Transhimalayan system »Kailas range» as it would be to call the Tian-shan the Khan-tengri range or Kwen-lun the Mus-tagh-ata range, for here a double cause of complication comes in, first that it is not a range, but a system of many ranges, and secondly that Kailas is a local name for a peak only. Finally it is superfluous to talk any further of the quoted objection, as Colonel Burrard himself has abandoned the name Kailas for the Trans-Tsangpo mountains.[2] On the other hand the name Kailas range should be used only for the range to which Kailas belongs, and under such conditions the Kailas range becomes, as it is in reality, only a part of the great Transhimalayan system. I have pointed out before that Reclus' Trans-Himalaya was *a priori* a very unfortunate name for Burrard's Ladak range.[3] I should have preferred the Water-parting or the Northern Himalaya or something like it, which showed that it is a part of the Himalayan system. The name Ladak range only shows that a portion of it is situated in Ladak. But then we could as well call the Kwen-lun the Pamir or Tagdumbash system. As, however, the name Ladak range is settled in geography, it would be unwise to try and substitute another instead of it. The case of a Kara-korum system even in the heart of Tibet cannot quite be compared with the Ladak range between Lhasa and Calcutta. For Kara-korum is the name of a mountain system and Ladak of an alpine country.

The following is Lord CURZON's view regarding my proposal to call the system Transhimalaya:[4] »As regards the name which Dr. Hedin has given to it, I will only say that the desiderata for the title of a new and momentous geographical discovery appear to be these: (1) that the name should if possible be given by the principal (Dr. Hedin would not say himself that he was the sole, or even the first) discoverer; (2) that it should not be unpronounceable, unwriteable, over-recondite, or obscure; (3) that it should if possible possess some descriptive value; and (4) that it should not violate any acknowledged canons of geographical nomenclature. The name Trans-Himalaya combines all these advantages, and it has a direct Central Asian analogy in the Trans-Alai which is a range of mountains, standing in the same relation to the Alai, that Trans-Himalaya will do to Himalaya. I am not in the least impressed by the fact that the name was once given to another range, where its unsuitability secured its early extinction. Any attempts to substitute another title on the present occasion will, in my opinion, be foredoomed to failure.»[5]

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[1] Ladàk, p. 50.

[2] Therefore W. BROADFOOT is only partly correct when he says: »in India it is believed that the senior officers of the Survey Department dislike the name, preferring the old name, Kailás range». Geographical Journal, March 1910, Vol. XXXV, p. 324.

[3] This name was first introduced, not by Burrard and Hayden, but by Godwin-Austen.

[4] Geographical Journal, April 1909, Vol. XXXIII, p. 435.

[5] Lord Curzon even uses the expressions Trans-Pamir and trans-Pamir. The Pamirs and the Source of the Oxus. Reprinted from the Geographical Journal for July, August, and September 1896, p. 72 and 82.

I would also mention in this connection that Professor ALEX. SUPAN of Breslau in a letter to me proposed the name Anti-Himalaya and that Major LEONARD DARWIN found this term perfectly correct and not open to such objection as Trans-Himalaya.

It may be interesting to consider the views of Colonel Sir. S. G. BURRARD regarding the orographical position of his Ladak range, as set forth in his and HAYDEN'S admirable work.[1] He obviously does not reckon the Ladak range to Himalaya, for he says: »The ranges of the Himalaya may be classified as follows: The Great Himalaya, the Lesser Himalaya, the Siwalik ranges.» But he alludes to the preliminary character of this classification, saying: »We shall not be in a position to define the limits of the Himalaya, until the geology of their extremities has been studied.»

Of the Ladak range he communicates:[2] »The western portion of this range was called by Sir Alexander Cunningham the Kailas range, on the supposition that the peaks of Kailas rose from its easterly continuation. But the Kailas peaks stand north of the Manasarowar lakes, and the continuation of Cunningham's Kailas range has been found to pass south of Manasarowar. Many writers have followed Cunningham, but Drew adopted the name 'Leh' range. Godwin-Austen called it the 'Ladak' range, because it was the principal feature of Ladak. We have accepted the name Ladak, and have applied it to the whole range from Assam to Baltistan. We are not, however, in a position to certify that a continuous range stretches in rear of the Great Himalayan range throughout the whole length of the latter from east to west.»

The following comparison is of interest:[3] »The Kashgar and Sarikol ranges thus constitute a system similar to that of the Hindu Kush and to that of the Great Himalaya. The Great Himalaya is higher than the Ladak range, but the latter is the water-parting, and its drainage cuts across the former through deep gorges.» Exactly the same is the case with the Hindu-kush and the Sarikol-Kashgar ranges. If now the Kashgar range and the Sarikol range together constitute a system, the Great Himalaya and the Ladak range should in a still higher degree constitute a system, as they are generally more intimately grown together.

The following words may also serve to clear up the question:[4] »The Ladak range forms the water-parting between the Ganges of Bengal and the Brahmaputra throughout the areas N, P, R and S, all of which are drained by rivers which pierce the Great Himalayan range and flow southwards: but near Chumalhari occurs the solitary exception; here the Nyang river pierces the Ladak range and flows northwards into the Brahmaputra.» From this point of view again, the two ranges must be regarded as belonging to one and the same system. And if the Ladak range were really a separate system, one could not easily talk of a Transhimalaya north of it, for it ought to be a Trans-Ladak system, which would, of course, be absurd.

[1] A Sketch of the Geography and Geology of the Himalaya Mountains and Tibet. Calcutta 1907, p. 75 et seq.

[2] Op. cit. p. 92.

[3] Op. cit. p. 105.

[4] Op. cit. p. 125, and 156.

Burrard continues: »The water-parting between the Indian and Tibet basins cannot be drawn with certainty: in places it is without doubt the Kailas range, but the latter has been cut through from the north by feeders of the Brahmaputra whose basins have not been determined. The Lhasa river, the Charta and others drain the trough north of the Kailas range, and pierce the Kailas range in the same way as the Himalayan rivers pierce the Himalayan ranges.» This view is perfectly right, although we should remember that both orography and hydrography have proved to be more complicated than it was believed when Burrard wrote. One cannot speak of a long trough north of a continuous Kailas range parallel to the Tsangpo. But some rivers, amongst them the two mentioned by Burrard came from — either a water-parting range or a water-parting valley-threshold between two ranges and pierce other ranges situated further south and nearer to the Tsangpo. Therefore the comparison with the Himalaya is quite correct, although in the Transhimalaya it is not always the pierced ranges which are the highest. In the section where Wood measured his high peaks it is so, but not further east, where Nien-chen-tang-la is the water-parting.

Another proof of the near relationship between the Great Himalaya and Ladak range may be found in the description given by the native explorer who crossed the Photu pass in 1873. Of this important crossing Burrard says: [1] »The height of the Photu Pass he found to be 15 080 feet above sea-level and 250 feet above the plains of the Brahmaputra to the north. This low depression in the Ladak range is a peculiar feature. It may have been carved by the Kali Gandak in a former geological age, when that river had its sources in Tibet and further north than at present.»

I crossed the same pass in the opposite direction, June 1907 and had an opportunity to see that the native explorers' description was perfectly correct. My Tibetan followers called it Kore-la. This may be the ordinary name amongst the Tibetans north of the pass, whereas Photu-la may be the name used on the southern side. For the present moment I will only quote what I have said about the place in my popular work: [2] »We have mounted only 315 feet from the river to the Kore-la, where the height is 15 292 feet. And from the pass there is a headlong descent to the Kali Gandak . . . The tentacles of the Kali Gandak are eating back northwards into the mountains much more quickly than the Tsangpo is eroding its valley. Some time or other, perhaps in a hundred thousand years, the Ganges system will have extended its tentacles to the bank of the Tsangpo, and then will be formed a bifurcation which, in the course of time, will bring about a total revolution in the proportions of the two rivers and their drainage areas.»

Whether the Kali Gandak, as Burrard thinks, has once had its sources further north in Tibet, or, as I presume, it will return to the north in future, or, which is

[1] Op. cit. p. 147. Compare also ibidem p. 155. — Vide Map, Vol. II, Pl. XXIV.
[2] »Trans-Himalaya», London 1909, II, p. 78.

the most probable, both cases are correct, the deep saddle of Kore-la seems to give some support to the view, that the Ladak range is only a part of and belongs to the Himalaya. But even if we leave all sort of speculation alone, the fact that the Indus, Satlej and Brahmaputra break through both the Ladak range and the Himalaya ranges, gives to the Ladak range the same orographical position as the Great Himalaya and the lower Himalaya ranges. This of course would not interfere with the name which has been accepted by Burrard and Hayden.

The question of new names in formerly unknown countries is a difficult one. The discoverer has of course the right to baptise mountain peaks and lakes which nobody has visited before and which have no native names. Nobody has made use of this right on a greater scale than Prshevalskiy, although many of the names he has given, specially in the Kwen-luns, begin to disappear more and more from our maps. Bonvalot has also dropped a lot of names behind him on his famous crossing through Tibet. Only once, in 1896, have I given a European name to a geographical feature in Asia, namely a peak in northern uninhabited Tibet, to which I gave the name of King Oscar. Burrard and Hayden have proposed some names for ranges, which are necessary and useful, and rather general appellations or terms than names. They are always geographical, not personal, Asiatic not European, and almost every one of them has its own history and *raison d'être.*

As regards the nomenclature of the Transhimalayan ranges, the following quotations may serve as an illustration. In the summer of 1910 I wrote:[1] »Herr H. Habenicht, of Gotha, has suggested to me the name of 'Ryder range' for the range situated to the north of the upper Brahmaputra, and I am only too happy to accept it. I regard the Ryder range as stretching between the eastern end of the Kanchung-gangri in the west, and the Ki-chu of Lhasa in the east. The range bordering the very upper-most part of the upper Brahmaputra, say from Cha-chu to Kailas, I should like to call the Strachey range, and the range from the Kailas along the upper Indus the Montgomerie range. But all these are mere suggestions which have to be submitted to the Survey of India and the Royal Geographical Society, and unless they are approved I am not going to use the new names. As a rule I hate European names on Asiatic maps. Wherever native names are to be found, no other should ever be used. But in some cases, and for lack of native names, it may be useful and practical to introduce exotic ones. And as far as Tibet is concerned, no names have a greater right to appear on the map than those of Montgomerie, Strachey, and Ryder.»[2]

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[1] Geographical Journal, August 1910, Vol. XXXVI, p. 193.

[2] »Tafel 2» in Petermann's Mitteilungen 1910, II, is an excellent map under the title: »Das Hochland von Tibet zur Übersicht von Sven Hedin's Reisen 1894—1908, Entwurf und Terrain von H. Habenicht, Situation und Schrift von C. Barich. Even this map is, however, only to be regarded as a preliminary one, for my sketch-maps on a big scale were not yet worked out. For 1910 it was the best and most complete map ever published over the whole of Tibet. Here the two ranges along

At the same time I wrote a letter to Colonel Burrard and asked his opinion. Colonel Burrard answered in a letter, dated Dehra Dun August 3rd 1910. Its contents are so important, that they should be known and respected by everybody who feels tempted to baptise mountains and lakes. The following is an extract:

»With reference to your proposed names for ranges the Indian Survey has strictly refused to introduce personal names on its maps for 50 years, and looking back, I think, that its attitude has met with general approval. In 1858 the Survey gave the name of Everest to the highest mountain, calling it after the celebrated Indian geodesist. This name provoked a storm of opposition, which has continued up to the present time. The Survey have adhered to the name of Everest, but they resolved never again to introduce another English personal name on to the map of Asia. If they had not strictly adhered to this resolution, the maps of the Himalaya would now be covered with English names, — names of travellers, sportsmen, statesmen, governors, and women. In 1885 a political officer called the big mountain S.W. of Kashgar 'Mount Dufferin' after the Indian Viceroy: the Indian Survey have not accepted it. The only personal names that the Indian Survey have accepted are: (1) Mount Everest in 1858. (2) The Hedin mountains[1] after yourself. (3) Such names as Prejevalski and Humboldt which were given by the Russians to portions of Northern Tibet which we had never explored, and for which we were not responsible. — It may seem ungenerous of me to object to the proposed names of Montgomerie and Strachey for ranges in Tibet, but the policy of the Indian Survey in refusing personal names has been beneficial to maps of India, and should be supported . . . There is a general opinion here that members of a Survey ought not to affix their names to geographical features. The moment that the Survey accepts personal names, it will receive numbers of requests. When there are several distinguished surveyors, who is to arbitrate as to which is the most distinguished? If we accept the name Montgomerie, another school of survey will ask us to accept Mount Holdich, and so on ad infinitum. The name of Ryder given by Herr Habenicht to the range north of the Brahmaputra has met with no approval in India. Ryder did not discover this range; he did not explore it . . . The Indian Survey has always called this range (since 1888) the Kailas range, because they thought that it was the same range (or earth-fold) on which stand the great Kailas peaks, the famous Hindu shrine north of Manasarowar. If the Kailas peaks are not on the western extension of this range, then the Kailas is wrong. — There are two other points about nomenclature that I think are worthy of consideration. One is this. In a complicated mountain area it is so difficult to analyse the individual ranges, that it is premature to distribute too many names. We have not invented any names for the numerous Himalayan ranges: we have accepted the native names, and have left the unnamed ranges without names. This course has proved advantageous, because detailed geological surveys are teaching us that the views of the original explorers about the separate ranges were incorrect. What they thought were ranges often prove not to be ranges. — My other point is this. The great objection to personal names is that the names proposed are all European. On the map of Asia no one has ever proposed to introduce the name of an Asiatic explorer. My opinion is, that no objection would be taken if you gave the name of Nain Singh, or of Krishna (A—K) to Tibet mountains. I believe

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the Tsangpo are called, as Habenicht proposed, »Ryder-Kette». The name is written twice, which points to the fact that we have to deal with two different ranges, belonging to different earth-folds. The same is the case with B. Domann's and H. Habenicht's beautiful map, N:o 62 in Stieler's Hand-Atlas, 1911.

[1] My Transhimalaya.

that such names would be generally approved: both these men were famous explorers, and both were Mongolians (with Hindu names). Nain Singh was the first explorer to see the long line of snow mountains in Central Tibet. He saw them from the north. If the northern range of the Hedin mountains were called the Nain Singh range, the name would be accepted and would be regarded as a generous recognition of an Asiatic.»

The wishes and principles of the Survey of India regarding new names have to be respected by everybody, even by foreign travellers and geographers. Therefore the proposals of Herr HABENICHT and myself lose all their force and have no more to be considered. In the part of this work where I describe my own discoveries north of the Tsangpo I use some names for distinguishing different ranges from each other. But I point out that these names must be regarded only as provisional, and may, in future, be substituted by others, when these, now hardly accessible regions, are put under the dominion and observation of surveyors from India.

The Survey of India made objections to my proposed name Transhimalaya. Their reasons were not sufficient nor persuading, as Lord Curzon says, and I quite agree with him. I regarded the name not only as a very correct and descriptive one from geographical point of view, but also as a monument over the historical development of exploration in the Trans-Himalayan regions, as they have been called since many decennia. And Transhimalaya is meant to be the title of the mountain system *par préférence* which is situated in the Transhimalayan regions.[1]

Colonel Burrard has proposed the names of Nain Sing and Krishna for Tibet mountains. I hope this proposal will be gladly accepted by all geographers. I am not in the position to say to which range Krishna's name should be given, for he has explored regions far east of mine. As to Nain Sing's name there is no doubt. It should, as Burrard proposes, be given to the mountain-system in Central Tibet, which is situated north of Transhimalaya.[2]

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[1] As was brought to my knowledge by the Private Secretary to H. Exc. the Viceroy, Sir James Dunlop Smith, in a semi-official letter, the Survey of India and the Geological Survey of India proposed to give the mountain system my name, and I was asked by the Viceroy, Lord Minto, to accept this proposal. As I understood the name Transhimalaya would never be accepted in India, I could not refuse, although I thought the honor was much too great for me personally. But everybody will excuse me that, in this work, as in the popular one, I have used the name Transhimalaya and not my own name.

[2] In a most interesting article, »Transhimalaya and Tibet», Dr. Felix Oswald says: »Exception has been taken by some geographers to Dr. Sven Hedin's use of the name Trans-Himalaya to designate the lofty system of ranges which he recently explored on the north side ot the head-waters of the Brahmaputra and the Indus. The chief objection seems to lie in the transference of the term from its somewhat vague reference by Sir Alexander Cunningham or by Colonel Godwin-Austen to the mountains north of the Upper Indus and Brahmaputra to a more restricted usage for a system or rather zone of mountains lying between the Brahmaputra (or Tsangpo) and the actual plateau of Tibet.» Dr. Oswald has no objection against the name I have proposed. — Science Progress, No. 17, July 1910, p. 38 et seq.

Berghaus' map in Stieler's Hand-Atlas, 1861.

Gen. Stab. Lit. Anst. Dresden.

CHAPTER XXVIII.

TIBET IN STIELER'S HAND-ATLAS.

Through the courtesy of JUSTUS PERTHES in Gotha I am able to reproduce some of the maps of Tibet which have been drawn and published in this celebrated officine. But as one of the principles of the firm is not to lend out the original plates or other materials to the maps, I have had the different maps simply and directly reproduced. They are therefore not always clear as shown in this work but, as I hope, clear enough to give an idea of the changes the map of Tibet has undergone since 1826, that is to say, during almost the whole epoch of modern exploration in that country. From this there is only one exception, Moorcroft, who falls before the earliest edition of Tibet in *Stieler's Hand-Atlas*. I need not to say that Justus Perthes in Gotha have at their disposal all material existing and that every new representation of Tibet includes every existing European knowledge of the country. Of course I could not possibly give every new edition of the map. Those here reproduced are characteristic and the distance in time between the different maps seems to be sufficient for giving an idea of the development of our knowledge. They have been chosen for me by H. HABENICHT in Gotha.

In other parts of this work I have already discussed the editions of 1826, 1834 and 1849. We now come to the edition, drawn in 1858 by H. BERGHAUS and published in 1861, Pl. XXVII. It is exactly the same as the edition of 1849. Only one thing has been improved: the region of the upper Satledj, after the journeys of Henry and Richard Strachey. For the first time we find the range north of the lakes called Gangri Gebirge and in front of it is Tise Kailas. The entirely conjectural Chor Kette is still there, and may be regarded as a worthy cartographical embryo to the eastern prolongation of the Kara-korum. As to the Kwen-lun and Kara-korum there is great confusion. The »Küen-Lün» range is regarded as the same as the Chinese Tsung-Ling which is correct, but Blaues Geb. is erroneously introduced by Abel-Rémusat, instead of the real meaning Onion-mountains. But the culmination of this Küen-lün range is called Karakoram Berg, and, following Humboldt, the »Karakoram Pass 17 000'» is placed on this range, although the Schlagintweits had already cleared up the orography.

In the edition of 1875 (Pl. XXVIII), drawn by A. PETERMANN and completed and corrected by E. DEBES and H. HABENICHT, there is much new detail, introduced from the maps of the Pundits of Montgomerie. Especially the whole course of »Tamdschan Khamba oder Jaru dzang bo» is given from Nain Sing's map, and the Tengri-nor and N.E. branch of the Indus are also taken from the Pundits. Nienchen-tang-la is called Ningkorla Berg and the range west of it Tsang Gebirge as already in Ritter's time. The range north of the lakes is called Tise Gangri. Tarogh jumtso and its surroundings are as on d'Anvilles map. Am tsiogk mtso and Dziru ju mtso are the same as in former editions. Nain Sing's Charta-tsangpo is called Dschatak-tschu, which is more approaching the real pronunciation, Chaktak. But the sources of this river are given as situated far to the north. In general our regions of the interior of Tibet have not undergone any change at all from the earliest editions of the map. A great improvement is the Kara-korum Gebirge, very energetically marked and in it the Kara-korum Pass has got its real height 18 550 feet. As its continuation is regarded the now modified range of Chor, which is called Lang bu ri. On both sides of it is a level plateau, covered with moving sands as in Takla-makan and Kisil-kum. The four big lakes north of Tengri-nor, in the existence of which even Richthofen believed, Buka-noor, Eldzighen-noor, Dzida-noor and Chara-noor, are still to be found, as they were already in the edition of 1826 (Pl. X). On modern maps they have disappeared, although the hydrography of this region is by no means yet cleared up. The Ike Namur and Bache Namur are still as given by the Chinese. As compared with reality the representation of Kwen-lun on the edition of 1875 is only an attempt and we still recognise the views of Humboldt. For instance on 86° E. long. the mountain range is two degrees too far south and at 90° there is hardly a vestige of Astin-tagh and all the other ranges situated here. It was only one year later that Prshevalskiy by his memorable journey to Lop-nor in these regions changed the map of Central Asia.

All this is improved in the edition of 1901 (Pl. XXIX), the improvements being introduced by C. BARICH on Debes' and Habenicht's edition of Petermann's map. On the plateauland we find only the routes of Nain Sing 1873—74 and Bonvalot of 1889—90. There is a tendency to mark ranges starting from the Kwen-lun towards the E.S.E. as on Dr WEGENER's hypothetical map. There is also a tendency to draw the Tanla Gebirge towards the west so far as to 84° E. long., which proves a perfectly correct view of the arrangement of the great folds. Nain Sing's central lakes appear and mark a valuable and most important addition to the map of Tibet. His extraordinary belief that Garche thol drained, with Tong-tso and Tashi-bup-tso, to the Chargut-tso is also marked, but the draughtsmen have, correctly, not dared to follow the Pundit's lead in letting the Chargut-tso drain to the Nakchu and to the ocean. We also find that the Pundit's river Dumphu and the other emptying into the Kyaring-tso, have occupied the regions where the older editions had the Botscha, or Tschaika tschu, a great and long river coming from the west

A. Petermann: Indien & Inner-Asien, Nördliches Blatt; Stieler's Hand-Atlas No 44 b, 1875.

Inner-Asien und Indien; Stieler's Hand-Atlas No 60, 1901.

Vorder-Indien und Inner-Asien (Nördliches Blatt); Stieler's Hand-Atlas N:o 62, 1904.

Vorder-Indien und Inner-Asien (Nördl. Bl.); Stieler's Hand-Atlas N:o 62, 1911.

into the Tengri-nor. On d'Anville's map it was called Tarcou Tsanpou. The successor of that fantastical river, Nain Sing's Dumphu, cannot be said to be an improvement. Ningkorla Berg is marked as the highest peak on the range Nin Tschen-thangla Gebirge. Ritter's old Tsang Gebirge has been transformed so far as to suit the peaks Nain Sing saw from the north. Otherwise my regions of the country north of the Tsangpo have undergone no changes and cannot have done so. Am-tsiogk mtso is still there, in the wrong place; the lake at the place of Amchok-tso is called Ike-unggana nor. The upper part of the Chaktak-tsangpo is called Lob-tschu, as in the earlier editions, and may have been taken from d'Anville who has a Lop Montagne at the upper Chaktak-tsangpo. There is no river of the name Lop or Lob in reality but a district called Lap, from where the head waters of Chaktak-tsangpo gather their water. Tarok-tso is still to be found but without name. The river which falls into the lake from the south and for which d'Anville has no special name, is called Tarogh-tschu. Ike-namur and Bacha-namur have not yet left the map and there is the old Chinese route from Lhasa to Khotan diagonally through Tibet, passing the stations or camps: Sari, Imam-Mula, Suget, Aritantun and Ilitsi, of which it is easy to recognise the two: Suget and Ilchi. North of the Transhimalaya we find the Tschalaring-tschu, a lake, into which the river Sumpu-tschui empties; this is Nganglaring-tso and Sumdan-tsangpo.

Only three years later, or in 1904, we have a new edition of the map, which, also from a technical point of view, now appears in a most accomplished form, Pl. XXX. Here in the northern half of Tibet some gaps have been filled with new routes, by Wellby, Rockhill, Littledale, Bower, myself and others. But the most important improvement of this edition is that all the old rubbish north of the Tsangpo, dating from d'Anville chiefly and with full reason suspected to be at least unreliable, has completely disappeared. Between Ghalaring-tso, Tede-nam-tso, Ngangon-tso and Mun-tso, all of which are given in dotted lines as being problematical, a great white blank is left on the map instead of the mosaik of mountains, lakes and rivers which dated from d'Anville and which I have been able to prove to be wrong. This edition of the map has been worked out by B. DOMANN. The name Nin-tschen-thang-la is given to the culmination point of the range south of Tengri-nor. The name Tise Gangri Kette has disappeared. The region surveyed by Deasy is entered. But between »Chalamba-la» and Kailas there is a blank. Only some slight and undecided hints of the probable existence of mountains may be found. As a curiosity I may mention that on the border of this map a very able and well-known cartographer of Gotha has written, with a pencil, the following words: »Nach den Punditen-Aufnahmen ist das Bild zum ersten mal gründlich verdorben», although this can hardly be said to be the general view amongst German geographers regarding the work of the native explorers. In one word, the chief interest with this edition is that all the old Lamaistic geography has disappeared, for as I have stated before, it is only round the sources of the Satlej and Brahmaputra that their geography is,

comparatively, wonderfully correct. On the map of 1904 there is no channel between the two lakes, and the bed of Satledj from Rakas-tal is marked as dried up. The name Satledsch is written along the correct river, and not along any one of the branches coming from south or north. Compared with other maps, those drawn in Germany and specially at Justus Perthes are by far the best, the most reliable and in every part most up to date.

If we regard for a moment the beautiful map published by the Royal Geographical Society under the title *Tibet and the surrounding regions, Compiled from the latest information*, and corrected in 1906, just when I started on my last journey in Tibet, we shall find, as on the last-mentioned German map, a great blank north of the upper Brahmaputra, where nothing but the word »Unexplored» is to be read. Even Tarok-tso has disappeared although it really existed, — but this of course could not be known as no European had ever heard of such a lake. The name Dokthol province is also given as on the Stieler map, although I have never heard it in this region or anywhere else. The sister-lake of Kyaring-tso, Chikut-tso, has disappeared in a mysterious way, although it really exists under the more correct name of Tsikut-tso. The most important feature is, however, the sharp mountain edge bordering the unexplored plateau towards the valley of the Tsangpo. This is drawn from Ryder's map.

If we then look at the 1909 edition of the Stieler map, worked out by Domann and Habenicht, we shall find, that what the R. G. S:s map gave as a border or edge of a plateau, has by the German cartographers been represented as a range, a range following close to the north of the Tsangpo, quite uninterrupted from Panggong-tso to Lhasa, and not having any kind of connection with the Nien-chen-tang-la range. As compared with Stieler's map of 1826, nay even with d'Anville's of 1733, this can hardly be said to be an improvement, for, whereas there *is* really, as on the old maps, a world of mountains north of the Tsangpo, there is no such uninterrupted range. The old maps are wrong it is true, but they give at least a general idea of the labyrinth of ranges, lakes and rivers which do really exist. But *one*, sharply defined range without connection with the Nien-chen-tang-la does not exist at all. On this map as well as on the edition of 1910 the name Trans-Himalaya is written in its right place. On both we miss the name Kailas or Kang-rinpoche, the most famous mount of Tibet. On both there is a connection between the two lakes and the Satlej issues from Rakas-tal.

The last edition of Stieler's map, again worked out by Domann and Habenicht, is published in 1911 (Pl. XXXI), and contains all existing material up to the present day. Here we find a connecting channel between »Lagang Tso» and »Mobang Tso», but no river issuing from the Lagang Tso. The blank north of Tsangpo is filled up with my new discoveries of 1906—1908 as taken from very preliminary maps in my book *Trans-Himalaya*. The map shows that there are no

longer any great white blanks in Tibet, although of course thousands of small unexplored regions still remain.

I have tried to follow the history of sheet N:o 62 that has been in *Stieler's Hand-Atlas* for 90 years. A staff of the most able German cartographers of the time has been working at this single sheet and there are years of conscientious, indefatigable and patient work in it. The spectator ought to look at this sheet with great respect, remembering all the toil and patience it has cost not only the explorers but also the cartographers at home to clear up this little bit of the earth's surface, which is, however, one of the most difficult and inaccessible in the whole world.

There is one thing I should like to point out especially and that can be controlled from the reproductions given, and that is, that no German cartographers, at least not those of Gotha, have accepted the extraordinary fantasies of Saunders as to his range north of the Tsangpo and stretching to the N.E. of Lhasa. The Gotha cartographers would never accept anything but information resting upon real observation, and they would not have it, and they were wise enough never to adopt this Gangri range, which does not exist and which would have remained as a memorial of their credulity if they had believed in it. But on the other hand one long range north of the Tsangpo may be found on some German maps, for instance, the famous map of Asia drawn by HEINRICH BERGHAUS in 1843 (Pl. XIII).[1] But it is nothing like the enormous, single-crested range of Hodgson and Saunders, which was copied by Atkinson. It is conjectural, but not quite so bad as the English one. After this confusion of different theories and native descriptions the fundamental features have now at last appeared as they are on my map and it will be the duty of future exploration to fill in all the details in those parts of the Transhimalaya, which I had no time or opportunity to visit.

[1] Its title is: »Karte von China und Japan, den Manen d'Anville's und Klaproth's gewidmet von Heinrich Berghaus», published by Justus Perthes in Gotha 1843.

MY JOURNEY IN CENTRAL TRANSHIMALAYA

Southern shore of Ngangtse-tso.

CHAPTER XXIX.

THE FIRST CROSSING.

In the preceding chapters I have tried to collect all that was known of the Transhimalaya in 1906. I have not dared to discuss the western and eastern continuation of the system beyond the frontiers of Tibet, as the material we possess is insufficient for any reliable conclusions, and under such conditions I regard it wiser to leave this problem to a future occasion. It only remains to me to give a general idea of my own results, and to begin with I have decided to describe every one of my eight crossings separately. I begin in the east and proceed westwards, disregarding the chronological order. After having described every separate transverse profile across the Transhimalaya, I will give a general *résumé* of the whole central part of the system so far as it is known at the present moment. Comparing my results with the contents in the preceding historical chapters, the reader will be able to understand in how far I have contributed to our knowledge of the central parts of this gigantic and most interesting mountain system.

The first crossing begins from Camp 108 on the Ngangtse-tso and ends a little beyond Camp 125 on the Tsangpo. The distance as the crow flies, is 216,6 kilometres, or 260 kilometres on my route. The height of the starting point on the lake is 4 694 m, the height beyond Camp 125, on the river, is 3 930 m. The culmination point of the system on this line is Sela-la with 5 506 m, which means a rise of 812 m from the lake to the highest point of the system, and a fall of 1 576 m from the same point to the Tsangpo. The distance from the Ngangtse-tso to Sela-la is 92,3 km, from Sela-la to the Tsangpo 127 km. Therefore the front-fall of the system towards the valley of the Tsangpo is much steeper than the back-fall towards the northern plateau land or Chang-tang. This fact will be more and more accentuated from west to east, so far as the Chang-tang, without outflow to the sea, stretches for beyond that limit the whole Tibetan mountain land begins to fall eastwards, in Kham and Szechuan. Westward, on the other hand, at the uppermost Tsangpo, there will be no difference at all between the plateau land and the Tsangpo, nay, we shall even find places where some of the lakes at the northern foot of the Transhimalaya will be found at a lower level than the corresponding parts of the valley of the Tsangpo. Or, in other words, the Tsangpo works its course deeper and deeper into the crust of the earth, whereas

the same height prevails all over the Chang-tang. Thus Richthofen's law regarding the difference between central and peripheric countries may be easily observed even within the boundaries of Tibet proper.

As all the lakes, from Tarok-tso to Tengri-nor, are practically on the same height, the small differences in height between the starting points of our eight lines do not play any important part. On our first line the difference of height between the Chang-tang, Ngangtse-tso, and the Tsangpo amounts to 764 m. This is the depth, on this section, to which the river has worked out its bed through the crust of the earth. And this is the value which is going to decrease gradually to the west.

Considering our first line of crossing I believe the best plan will be to divide it into two parts, both starting from Sela-la. Thus the orographical and hydrographical arrangement will be more clearly understood.

The culminating pass on the first line is generally called Sela-la, although I heard the name pronounced Sela and Tselal or Tselal-la as well. One guide called it Chang-la or Pod-la, but the combination of these two words seems rather to be a *nomen appellativum*, for all the water-parting passes on the eastern half of the Transhimalaya are regarded as Chang-la-Pod-la's, i. e. passes between Chang or Chang-tang and Pod or Pö, Tibet proper.

It seems likely that the Sela-la should be situated in the same range as the Khalamba-la, but it should be remembered that we have no proof whatever that such is the case. For between Khalamba-la and Sela-la there is a perfect *terra incognita* and it is possible, perhaps even more likely, that the Nien-chen-tang-la instead of continuing to Sela-la, takes a more southerly direction and slowly becomes lower and finally disappears near the northern bank of the Tsangpo. A snow-covered group east of the pass is called Kyar, although this name seems to signify a special range which may be parallel to and situated north of the Nien-chen-tang-la. Very likely its northern side drains to the Bara-tsangpo and Kyaring-tso.

The Chang-tang road goes eastwards up to the pass of Sela-la and on its other side turns S.E. The configuration is irregular, for north of the pass the water goes to Ngangtse-tso, S.E. it goes to the Tsangpo and S.W., and even a long way to the west the drainage is also to the Tsangpo. Therefore the road for some distance keeps on the top of hills which constitute a water-parting between the lake and the Tsangpo, although the last and definite and highest water-parting pass is Sela-la with its 5 506 m height in porphyry, quartzite and mica-schist. Another water-parting threshold a little further west, has only 5 484 m.

The view to the S.E. from the pass does not reach very far as it is hidden by considerable mountains on both sides of the Sele-nang valley. So far as one can see there is, however, a labyrinth of ridges and ranges, and, coming from the north, one is struck by the difference in relief and general morphology between the Chang-tang and the peripheric zone. Such accentuated forms are very rare in Chang-

tang. The view to the north is hidden by a comparatively high range on the right side of the Naong-tsangpo.

South of the 5 484 m high threshold there is a very deep-cut valley called Sangra-palhé; a whole series of deep ravines go down to it from the Sela ridge. A rock near the threshold is called Sereding and consists of quartzporphyrite. Between it and the principal pass is a conical rock called Serpo-tsungé, which stands as a boundary pillar between Chang-tang and Pod. The ordinary road follows the Sangra-palhé valley in summer; but as the bottom of the valley is filled with ice in winter, the Sela road is taken at that season.

West of Sela-la there is a very considerable range called Pabla, running towards W.S.W. This is the continuation of the Kyar, and perhaps of the Nien-chen-tang-la. The nearest part of the Pabla is called Sangra, a massive which gives rise to the Sangra-palhé. This part of the Pabla is very irregular and consists of several groups, separated from each other by deep valleys. Two such groups, west of Sela-la and Sangra, are called Torma-karu and Bupchung-ri; there is also a Bupchen-ri. Some of these mountains should perhaps rather be regarded as ramifications from the Pabla crest. On the way up from Camp 114 to near Sela-la one has the Pabla with its wild rugged forms all the way on the right hand. The range is broad, compact and irregular and has only small snow-covered summits, no considerable peaks. The name Pabla seems to be bounded on the section of the range which lies between my first and second lines of crossing.

East and west of Camp 116 several tributaries to the Naong-tsangpo go northwards and between them are rounded hills crossed by the road. They are passed in small secondary passes, two of which, a little to the west of Camp 116 are resp. 5 399 and 5 199 m high. As a rule they are marked with cairns and *mani*-flags. Camp 115 has a height of 5 134 m and is situated in the Naong-rung or valley of Naong-tsangpo. The prevailing rock is diabas-porphyrite.

With our present knowledge it is impossible to form any clear idea about the orographical arrangement between Naong-tsangpo and Bara-tsangpo. There must of course be a water-parting between them, perhaps a meridional ramification from the Pabla. But remembering the general tendency of parallelism I regard it more likely that there is a west-east running range, or perhaps two, south of Ngangtse-tso and Kyaring-tso.

Continuing to the W.N.W. from Camp 115 the road follows the valley of Naong-tsangpo, which is well marked between rounded hills where only occasionally hard rock, quartz-porphyry, crops out. Sometimes the valley opens out to a little plain with grass and swamps. The ground is very uneven on account of the binding power of the grass-roots and the washing action of the water; otherwise the ground is gravelly. All the tributary valleys contain small, frozen brooks. One of them, from the left, is called Keang, two from the right side Kamchen and Kamchung; in the background of Keang three comparatively high peaks of the Pabla are visible with some snow. Nangba is a valley from the S.W. or left side.

The valley falls very gradually to the N.W. At Toa-nadsum or simply Nadsum, Camp 114 is at a height of 4 986 m. Here three valleys meet: Naong-tsangpo which receives the Kesar-tsangpo from the left and the Kung-tsangpo from the right; where the road crosses the Kesar this brook is enclosed between 2 or 3 m high erosion terraces with rounded edges. The junction takes place on an open plain with almost perfectly level ground. The three brooks form the Tagrak-tsangpo, which enters the S.W. corner of Ngangtse-tso. The mountains on both sides of the route are surprisingly low, generally mere hills.

Looking round from Camp 114 the following names may be noticed: to the N. 60° E. there is a little salt lake, Tsagga-tso, which seems to be situated somewhere near a red ridge (N. 20° E.) called Tsagga. To the N. 50° E. is a valley Goa and N. 80° E. the valley Yakchung. A ridge in S. 83° E. is Gumcho. S. 56° E. is the comparatively narrow valley through which the Naong-tsangpo comes out. Mount Bupchen is visible to the S. 35° E., and S. 15° E. is a snow-covered massive called Lassár; between both is the valley Rekur. Straight south is a valley Tokya and the mountains west of it are called Toke-ri. S. 48° W. is the mouth of the great valley of Kesar-tsangpo, in the background of which a small double peak is visible. A part of this valley is called Martsu. N. 70° W. is the valley Kokam. A black range to the north is called Yaï.

Camp 113, Kaï-pangbuk, is at a height of 4 910 m in the valley of Kaï-rung, through which the Tagrak-tsangpo flows. Near the Camp the road crosses a little threshold, Chi-la, only to avoid a narrow passage of the valley.

The valley of Tagrak-tsangpo is rather winding, comparatively narrow, and surrounded by more considerable mountains than hitherto, where quartz-porphyry prevails, although, as usual, hard rock is rare. Tuk-tegra and Kapcha are names of parts of the valley. The river was all frozen over, but water is streaming under the ice. From the point where the road leaves the Tagrak-tsangpo on its left the river is seen continuing to the N. 80° W. through its well marked valley down to the lake. To the S.W. another valley, Kodong, is seen, through which a 9 days' road is said to go to a village Mü, of which I could get no reliable information. From S.S.W. comes the valley Jajang, probably originating from the Pabla. Between these two valleys there are several others, all belonging to Tagrak-tsangpo.

Leaving the Tagrak-tsangpo the road goes up into the right tributary Buser-tsangpo, where Camp 112, Kapchor is at a height of 4 959 m. From here a peak is seen to N. 71° E. called Chao-tokde, and N. 82° E. is the opening of a valley through which a road goes to Shantsa-dsong or Shetsa as it was called here. To the E. and E.S.E. the region is called Porchung. S.S.E. is a peak Tselak, and S. 29° W. one called Moruk. North of it goes a 5 days' road to Targo-larkyap on the southern side of Dangra-yum-tso.

Instead of following the Tagrak-tsangpo down to its mouth in the lake, the highroad thus crosses a small mountain range, situated on the southern shore of

Ngangtse-tso and Marchar-tso, and parallel to the one mentioned before, unless it is not simply a ramification from the same. Its form is irregular and we have to cross it in two passes. The road up to the first pass follows the valley of the Buser-tsangpo, where Camp 111, Nama-chang, has a height of 5 055 m. Conglomerate of quartz-porphyry is found at Chak-yola. The valley is broad and surrounded by low hills. Springs are numerous, sometimes, as at Tsari, forming open basins.

A very flat threshold separates the Buser-tsangpo from the Titak valley, which goes down E.N.E. to lake Marchar-tso; this valley is winding and comparatively deep cut; its bottom is full of ice from springs, and such is also the case with the bottoms of all its tributaries. The Titak is separated from a brook to Ngangtse-tso by Pongchen-la, which has a height of 5 371 m, only 135 m less than the principal water-parting pass Sela-la. From the pass one has a good view of the Pabla range, which does not make any deep impression on the spectator, on account of there being no high peaks at all. Between Camps 110 and 111 the rock chiefly consists of quartz-porphyry and quartz-porphyrite. From the pass the fall is steep down to Camp 110, Lamblung, at 4 895 m. To the N.E. two valleys, Ngochen and Ngochung, are to be seen. Pongchen-la is a flat pass with a cairn; some *manis* are built at its western side.

The second pass is Chapkar-la, 5 326 m high, from where the Chapkar valley goes down to Ngangtse-tso. The view from its height is so far interesting that to the N. 74° E. and S. 86° E. several comparatively high snow summits are to be seen. The rock, down the valley, is limestone. Springs are numerous. As a water-parting Chapkar-la has a low rank, for both north and south the water goes to the Ngangtse-tso. South of it several brooks are crossed, going S.W. and probably joining and entering the lake east of Tagrak-tsangpo; Chakti is the name of one of them.

The Chapkar valley is narrow, but not particularly deep cut. The rocks at its left side are steep, on the right they have a moderate slope. The height of Ngangtse-tso is 4 694 m, which indicates the deepest depression on the northern side of this part of the Transhimalaya. The water of Dangra-yum-tso and Marchar-tso is said to be as undrinkable as that of Ngangtse-tso. Both Nangtse and Marchar are surrounded by old beach lines, although not so considerable as those of Dangra-yum-tso. As the neck of land between them is very low they certainly were connected not very long ago. The Marchar-tso is very narrow in its middle, and will, if desiccation goes on, become divided into two halves. Daruk-tso is said to be a lake some 6 days to the N.E. and as big as Marchar; perhaps simply Chargut-tso was meant. Nain Sing's Chikut-tso was here known under the name of Tsiku-, Tsikut- or Tsekun-tso.

The region south of Kyaring-tso is very little known. The Ota-tsangpo, or Tsangpo-ota as it was called here, is said to run N.W. from a high valley, Muktsuk-chuk, between Sela-la and Khalamba-la. The Ota is therefore an equivalent to the Tagrak-tsangpo. Between both the Bara-tsangpo goes north to Kyaring-tso.

From only one crossing from Ngangtse-tso to Sela-la over this labyrinth of low mountains it is impossible to get a clear idea of the orography. It is so much the easier to understand the hydrography. For there is only one river system, namely that of the Tagrak-tsangpo, receiving a great number of tributaries from both sides, those from the left side being the greatest, depending on the fact that the principal valley, Naong-Tagrak, runs to the N.W. Thus we have found, that all brooks running north from the Pabla range join the Naong-tsangpo. Some of them have the same name as the particular part of the Pabla, from where they originate. For instance, the Bupchung comes from Bupchung-ri, and Bupchen from Bupchen-ri. Both these, as well as Kelung-tsangpo and several others more or less parallel to them are deep, narrow transverse valleys on the northern side of the Pabla. The brook which starts from the very saddle of Sela-la receives many small tributaries from a range on its right or northern side, which must be a ramification from the principal range. The Serpo-tsungé also sends some furrows to it. To the S.E. Sele-nang goes down and is soon joined by the Sangra-palhé, which is more considerable.

From a hydrographical point of view the Pabla range is of great importance as a boundary between the plateau land to the north, i. e. the land of the central lakes without outlet to the sea, and, on the south, the drainage area of the Tsangpo. The southern water-parting of the Ngangtse-tso is therefore at a great distance from the lake, whereas the western, northern and eastern water-partings are very near the lake. From this point of view the Ngangtse basin resembles the Selling-tso basin, where the Sa-chu-tsangpo comes from far away and the rest of the water-parting is quite close to the lake.

Other watercourses we have touched, the Titak, Chakti and Chapkar, are quite insignificant, as compared with Tagrak-tsangpo. On five of our eight crossings we shall find the same arrangement: a river originating from the Transhimalayan water-parting and running north to a salt lake situated in the lake depression at the northern foot of the system.

The *climate* in the mountains between Ngangtse-tso and Pabla is very raw, cold and inhospitable in January; almost always wind and heavy clouds, but very little snow. Only the heights round Sela-la were covered with patches of snow at the end of January, but only in depressions and ravines had it accumulated more considerably. It never caused any obstacles to traffic, and it hardly ever occurs that the passes are closed by snow.

The mountains are rich in water, springs and brooks, which all remain hard frozen during the winter. A traveller coming from Chang-tang will at once notice the great difference in this respect; he has traversed a very dry country, where water is often a great rarity and he enters a region, where brooks and springs are to be found in every valley. At the end of January the ice of Tagrak-tsangpo was said to remain 3 months more or to the end of April. The melting of the ice in spring

On the heights of Transhimalaya.

causes some swelling but no inundation. On the lakes Dangra, Ngangtse, Marchar and Kyaring-tso, the ice was said to remain till June which seems to be somewhat exaggerated.

The rainy season sets in about the end of June or in July and continues to the end of August or beginning of September. Some years the precipitation is very considerable and all the brooks in these innumerable valleys become filled with water. After heavy rains the Tagrak-tsangpo cannot be forded at all. Some years there is almost no rain at all. The rain is a condition of life for the nomads. Snow-fall in summer is an ordinary occurrence in these high regions. Thus, for instance, the mountains round Ponchen-la are regarded as a cold tract even during summer.

As all over high Tibet the grass is poor and scanty, and above Camp 116 there is hardly any grass at all. The animal life is less rich than on the Chang-tang, hardly anything except rabbits and *kyangs* being seen.

Under such conditions it is not surprising that the population is so very scanty. I saw or heard of only 48 tents on this road. From Sela-la to Camp 114 only one tent existed in a side valley. On the plain of Toa-nadsum 22 tents are pitched during winter, 18 or 20 in summer. Between Camps 112 and 113 six tents were seen, two of which, on the Tagrak-tsangpo, possessed great flocks of sheep and yaks. On the Buser-tsangpo 4 tents were pitched. Even during the summer only few nomads visit the region round Pongchen-la, in winter none. In the valleys round Lamblung 11 tents had their winter grazing grounds, and in the mouth of the Chapkar valley I saw 3 tents.

Thus, proceeding from Ngangtse-tso to Sela-la the population becomes more and more rare, or, in other words: the higher the altitudes, the rarer the population. In summer the distribution is of course different, although the nomads assured me they did not make any long wanderings, but passed the summer in neighbouring valleys.

This road over Sela-la is the highroad from Ngangtse-tso to Shigatse. The two secondary passes of Chapkar-la and Pongchen-la could easily be avoided if following the course of the Tagrak-tsangpo, which, however, would mean a great detour. During the winter there is not much traffic, but the numerous cairns, *manis* and small prayer-flags, and the several parallel paths worn out in the ground prove that many men, ponies and flocks pass here every year.

Ngangtse-tso is situated in the province of Naktsang, but south of it and the whole way to Shigatse the country belongs to Labrang, i. e. Tsang, the province of Tashi-lunpo. It is not always easy to make out the boundaries; at Lamblung, for instance, the ground is said to be reckoned to Naktsang, although the inhabitants pay tribute to Labrang. From Camp 112 to the Pabla range the district is called Tova-tova, in which name we recognise Nain Sing's Doba-doba-tso, a small lake never heard of by my guides. The district north of Tova-tova is Damsak-geva, and south of it is Chichen.

to the great rounded heights where the valleys are comparatively shallow. East of Camp 119 considerable mountains are seen, from the valleys of which the water comes down to Tagar-ongma.

From Camp 119 the road again aproaches a pass. It follows the very gravelly valley to Chesang, which receives from the right side the tributaries Chagelung and Lungsang, the latter with a road to the above-mentioned place Chingdu. Chialung is a point with pasture and a tent; further on the right tributary Chesang-larnang comes in from the S.E. The road up to the pass is not quite as steep as that of Shib-la, but full of detritus, nothing but blocks and gravel. Only near the pass is there solid rock of porphyrite. The name of the pass is Chesang-la, and its height is 5 474 m, only 32 m less than the water-parting Sela-la. This gives an idea of the general evenness of the crests. The pass is flat and covered with heaps of gravel.

On the south side the small valley Terung-pa goes down to the greater Yangsar. This valley is also full of blocks and gravel; it has three fluvial terraces, each about 5 m high, remains from a time of profuse precipitation. From the left side the valley Lever joins. One valley opens out to a plain and receives several tributaries from the right or west; the principal watercourse keeps to the left side along fairly high mountains. Camp 120 is called Tak-rerar, but the whole valley around is Sham. The height is 4 635 m.

Below the camp the valley again gets narrower. The widening of Sham must during rainy summers become a real swamp, as watercourses gather here from all sides. From the left a short and steep valley, Deunglung, comes down, from the right Pale and Yangsang. Here is a *mani-rigmo*, 45 m long.

Finally the Sham valley joins in a small widening the greater Bup-chu or Bup-chu-tsangpo, the most considerable river in this part of the Transhimalaya. It flows from east to west, and has even now, at the coldest season, open water in its middle, perfectly clear and with plenty of fish. At the junction the Sham river forms an ice delta in the gravel of the valley. In summer the Bup-chu is said to be so swollen that it cannot be crossed without a ferry.

It is difficult to understand the general orography in the upper reaches of Bup-chu. Its sources are said to be at a distance of two long journeys to the N.E. From its principal source the river first flows southwards and then gradually turns west. From the junction with the Sham it first continues S. 80° W., then west, and finally N. 80° W. and joins the Mü-chu near Linga-gompa. The distance from the junction of the Sham and Bup-chu to the junction of the Bup-chu and Mü-chu was reckoned by the Tibetans as two long marches; in fact it must be about 40 km. The fall of the valley on this distance is 136 m, for the first junction is at 4 467 m, and the second, near Linga, is at 4 331 m. On the other hand, the fall from Chesang-la to the Sham junction is more than 1 000 m, which gives an idea of the vertical undulations of this road.

Nomads in the Transhimalaya.

On the way down to Linga, where the Bup-chu valley is enclosed between fairly high mountains, the river receives many tributaries. Only from interpolation and from native reports do I conclude that the joint river from Shib-la and Chesang-la must join the Bup-chu somewhere below the Sham junction. And still lower down the joint Sangra-palhé and Sele-nang runs out into the Bup-chu. This river is therefore of considerable size, in fact I found later on that it carried the same volume as the Mü-chu itself and the question is whether the Bup-chu, as being much longer, should not be regarded as the principal branch. But as the name Mü-chu is used the whole way down to Raga-tsangpo, the brook from Chang-la-Pod-la must still be regarded as the source.

From the Sham junction and upwards there is said to be a village of ten families called Sechen situated in a tributary valley from the left side. Looking up the valley a great mountain massive called Shakchen is seen; west of it is the valley Rakchung and west of that mount Mugmu and the small valley Sechung. The ridge between Bup-chu and Sham is called Dakchung.

A short distance below the Sham junction the Bup-chu receives a tributary from the left, called Dangbä-chu. Two small valleys entering the widening quite close are called Niri and Kejak. The road goes up the Dangbä-chu to the S.E.; it is surrounded by fairly high mountains; Duyung is a left tributary; at Dochen stone-huts are built. Near the right tributary Chagelung a tight, dark quartzite stands in solid rock. The gravel in the valley is chiefly porphyry, schist and conglomerate. From the right side the two valleys Nalung and Dalung enter, and at the point of their junction are two small villages Lundup and Tamring. Camp 121 is at 4 619 m.

A little above this camp the tributaries Tsubelung and Lalung enter from the right; another valley from the same side on the way up is Nevo-goma; from the left enter Nevok, Chialung and Lung, where biotite-granite forms solid rock, — higher up Yagbe. The mountains round the valley of Dangbä-chu are rather low, and solid rock is rare; detritus of all sizes fills the bottom and the slopes. The whole bottom is full of ice. The gravel and ice together make this road anything but comfortable.

Finally the road leaves the Dangbä-valley which is seen coming from the south, where it is formed by two smaller valleys, Seuk to the east, and Yak-maru to the west. The name Dangbä-chu, however, remains with the small right tributary which comes down from the pass; Larnang is a right tributary to it. The slope up to the pass is covered with blocks of granite. The pass has a height of 5 250 m and is situated between two peaks; it is rather flat.

Dangbä-la has so far a higher hydrographical rank than Shib-la and Chesang-la, as it is a water-parting between the system of the Mü-chu to the north and the Rung-chu to the south; the latter goes direct to the Tsangpo below the junction with the Raga-tsangpo. The upper part of the Rung-chu from the pass to Camp 122, Ngartang, at a height of 4 909 m, receives a series of small tributaries from both sides, the names

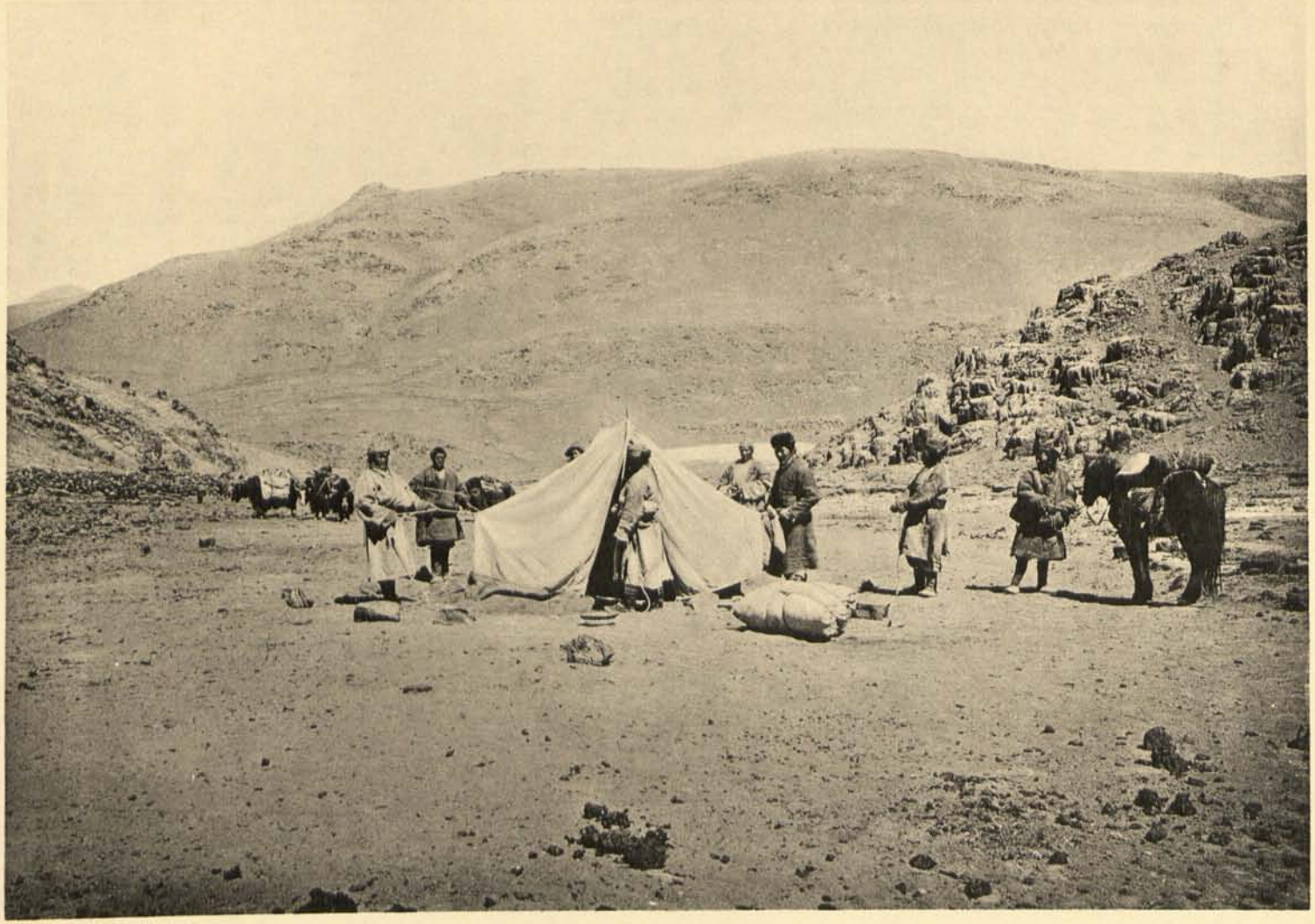
of which, to the left, were said to be: Dädä, Güju, Chogro, Langa, Chamle, Kongsang, — and from the right: Shumgo, Tok-chamba, Tüshu, Chagelung, Puyung, Tangyung and Paumpu. Through all these valleys small brooks, now frozen, run down to form the Rung-chu. Between Mü-chu and Rung-chu only very insignificant tributaries flow down to Raga-tsangpo. At Ngartang the valley opens out to a little triangular plain.

The highroad from Ngartang to Shigatse has two more passes to negotiate, which could be avoided if the Rung-chu valley were trafficable. But it is said to be impossible, for it is deep cut between high and steep mountain walls and its bottom is full of ice; there is a path on the slope, but it is covered with ice from several springs in winter. During the summer the Rung-chu road can be used; it keeps partly on the slopes, partly in the bottom of the valley, which, however, is sometimes full of water. The Rung-chu is said to form a series of rapids and waterfalls making a great noise; the difference in height between the Dangbä-la and the Tsangpo near the mouth of the Rung-chu is also considerable, namely, 1 320 m in a rather short distance. Chumbulung is a massive on the left side of Rung-chu, a little below Ngartang. Near Ngartang two small valleys, Chochung and Yanglung, enter the triangular widening, and another, coming from N. 25° E. is called Malung; its frozen watercourse is crossed by the road; all these brooks join the Rung-chu. On the left side, or to the east of Malung, the road ascends rounded earth- and moss-covered hills. To the north the valley Sanglang is seen with a road to Chingdu. To the N.E. and E.N.E. some mountains are seen, Ganglep, Denjum and Kyangduk, of which only the last-mentioned is snow-covered. Sari is a valley in its neighbourhood. Quite close to the south, is a small peak, Rikung-nakbo.

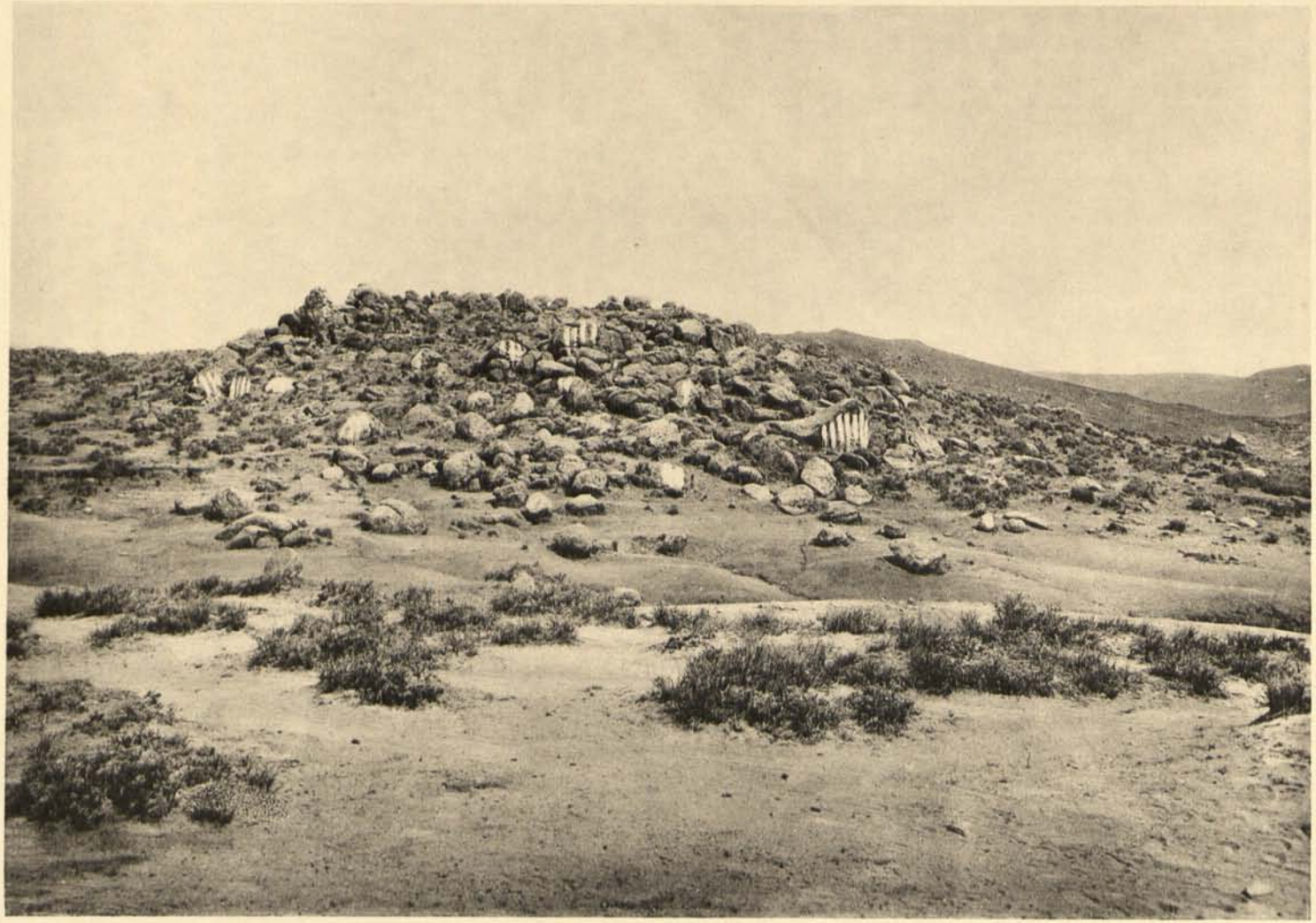
The valley from the Ta-la is called Talung; along it the ascent is steep for a while, but suddenly the valley opens out like an arena, almost perfectly level, covered with moss, blocks and gravel; a very low ridge bounding it on the N.E. is called Ya-ngopcha. The name of the arena is Gelung; Kelung is a valley parallel to it further N.E.; beyond it is Ganglep with the valleys Nolung and Dalung on both sides. Higher up are the peaks Chimbok and Nagdinga, situated S.W. of the road, and Selung-nakbo a left tributary.

Ta-la is 5 436 m high, only 70 m lower than Sela-la, which again shows the great general evenness of the different ridges and ranges, although the country is so extremely cut down by erosion between them. The pass is situated between low rocky crags, those to the N. E. called Yere-muktsuk, those to the S.W. Layingumpo. In the direction to the Tsangpo are clearly seen three different flat ridges or ramifications from a greater ridge further east,; the nearest is reddish and called Chagle-ding, and the next, in the middle, which is black, Tanak-ri. In the distance, beyond the mighty valley of the Tsangpo, the snow-covered Himalaya is visible.

The valley going down S.E. and south from Ta-la is called Tokja and a peak west of it Tag-nakbo. On the pass and in the valley biotite-granite and pegma-



Camp 124.



White-painted stones on the La-rok pass.

tite prevail. A black ridge to the west is called Tsabu. Camp 123, Kabalo, is at 4 344 m. Here the valley from the pass Tukung joins the Pema-nakbo-tang valley which comes from the mountainous region Napcha in the N.E. Up the Pema-nakbo there is a road to Chingdu, a name we had heard of several times before; it is said to be a region with good pasture-grounds and inhabited by many nomads. From Kabalo it is three days' journey to Chingdu, and the way is said to cross three passes. Pema-nakbo is a left tributary to the Rung-chu; therefore the Ta-la, although nearly 200 m higher than Dangbä-la, is of less hydrographical importance.

From Kabalo the following geographical objects are visible: S. 17° W. a peak Adchu-ri; S.W. Pee-ri, a mountain a few miles off; S. 72° W. mount Ayang; N. 85° W. a great valley Gula with a road to Ngartang and Rung. To the N.W. Talang is a considerable group, N.E. of which is seen the valley of Kyashova; N. 30° W. is the region Larkok and N. 22° W. a valley Chachung-pu; N. 18° E. the valley Yamdo; N. 35° E. mount Kori-yung; to the N.E. the valley Tachen-napta-shar, to the south of which is Lungchung, and further south Lalung and Santong, — all situated in the neighbourhood.

The road follows the Pema-nakbo valley down; it is fairly broad, to the right or west it is bounded by a mighty range with many transverse valleys, all of them containing frozen brooks; the ground is sandy, some tussock-grass appears. The watercourse is bounded by well developed erosion terraces. Tributaries from the right are: Migmang, Samalung, Damnga-tang and a valley from the pass Luk-la, over which a road goes to a well populated tract on the Rung-chu; at Changma there are a few huts. From the left: Santong-la-ongma, Pendha and Lalung, two of which are mentioned above. Arung-kampa is a fort in ruins and a village in the middle of the valley. The region round Camp 124 is called Shepa-kava; there is also a *dsong* in ruins called Dokang-pe; therefore the place is also called simply Dokang, and the brook of Pema-nakbo also Do-chu.

After having passed a little plain or widening of the valley, Yülung-tanka, and left to the right a small monastery, Chega-gompa on a hill at the foot of mount Hasha, the river pierces the mountains at Chomo-nyupcha and goes between dark, steep rocks down to Rung-chu. The junction takes place at Tsolung, below which the joint valley is called Amnak-rung. After a short run the river enters the plain of Ye. Dongra and Gasa are mountains on its left side. All these places are situated a little to the west of the road, which takes a more S.E. direction up to the pass La-rok, which is only 4 440 m high, but well known all round and even north of the Pabla. Another low pass is situated a little further east with a road to a valley called Chimser. The ground is sandy, not gravelly as hitherto; on the pass are heaps of blocks. On and beyond the pass the living rock is porphyritic granite and turmalin-quartzite.

The slope down from the La-rok is not regular, for here the road crosses

several ravines going S.W. to Rung-chu and the plain of Ye. The feeders of Rungchu above La-rok were all frozen, but on the plain of Ye the water streams freely.

The steep slope from La-rok takes us down 491 m, or from 4 440 m to 3 949 m, in hardly more than an hour, and one has a feeling of leaving the cold and rough climate of Chang-tang behind and reaching more moderate and mild regions. The granite of the slope is extremely worn by weather and wind, rotten and weathered, formed into cupolas, cavities and ravines, and even the road is sometimes one metre deep cut in the granite, which gives evidence of heavy traffic, even if the water plays a part in eroding and excavating the pathway. At some places round granite blocks are situated on pedestals of earth just like glacier tables, proving that the surrounding earth has been swept away by wind and water; thus only the pedestal which is protected by the block is left.

On the way down over the Ye-shung plain to the Tsangpo several villages and monasteries are passed. There are the monasteries Tukdän-gompa and Gandän-chöding in the north, and Tashi-gembe to the west. To the left some small valleys open, Didung from the regions of Sumno-gompa and Ngompo-ritse; Kuratse from the mountainous region of Tanak-sila; Sharchuk-nang with a small brook. Tenatsatung is an isolated granite rock to the right of the road. Another small mountain to the right is Ngun-chu with several transverse valleys, Yunggung, Cheto-la, a. o. The plain east of it is called Ngunchu-tang. To the left is the valley Tarting, from where the brook De-chu comes down, with a 3 m high terrace on the left. In the Tarting valley is a village Tarting-choro, and above it the great monastery Tarting-gompa. The mountains west of it consist of conglomerate of quartz-balls, at a place called Sebrak-hla. Tanka-gompa is another temple in the same neighbourhood. Beyond this the plain is called Tanka-sha.

Opposite Rokdso, a ferry-place and village, the first rock corner to the left of the road is called Nanka-song and consists of grey granite. At the village of Karu, where the Karu-pu comes in from the north and the Su-chu from the south, to the Tsangpo, this first line of crossing, which began at Ngangtse-tso, comes to an end.

My first line over the Transhimalaya, the general topographical features of which I have now shortly described, crossed a complete *terra incognita*. From this region nothing else was believed to be known than the fantastical and perfectly wrong topography and hydrography as given in Nain Sing's map. Nobody could expect that the Pundit would be able to lay down the geography of a country where he had never been, for even one single crossing is not sufficient for a clear conception of the whole region. Only the hydrography is easy to make out, especially when the discoveries on my first line are combined with those on the second. But regarding the orographical arrangement the case is different.

From native information it is impossible to form an idea of what the highlands are like in the region where the eastern tributaries of the Mü-chu and Rung-chu

La-rok. Looking S 55° E.

have their sources. Still further east we know the line of Shang-chu and Khalamba-la to Tengri-nor, a road that has been completely done by two expeditions. It is, however, only known in great features. North of the Nien-chen-tang-la, or from Khalamba-la, a river, Dungche-chu, goes down to a salt lake, Tengri-nor, and south of the same pass a river, Shang-chu, goes to the Tsangpo, exactly as in the case of our first crossing, where Naong-Tagrak-tsangpo goes to Ngangtse-tso from Sela-la, and Sele-nang-Bup-chu-Mü-chu goes down to the south. But it is not known whether the valley, Ta-nakpo-chu, which is situated between the two, has the same geographical value and position as its two neighbours. If such be the case, — as is hardly likely —, it comes from the great continental water-parting, or in other words, from a pass on the Nien-chen-tang-la which has exactly the same importance and functions as the Sela-la and Khalamba-la.

Even the following information which I got from a reliable man at Namachang, Camp 111, does not throw sufficient light over this complicated region. He said that we had to make our choice between two different roads to Shigatse. If we took the eastern road we should not find nomads for some 10 days; water is sufficient, although less than further west; some grass is to be found. In the summer a few tents are pitched along the road. There are several difficult and high passes; the highest of all is Pa-la, which is »three times as high» as the Pongchen-la, as my informant put it. The western way, the one which I took, is said to be two days shorter than the eastern; it is full of gravel, but avoids passes. The informant had never travelled the western road himself, but knew the eastern one from many journeys. If Shib-la, Chesang-la, Dangbä-la, Ta-la and La-rok, from the native point of view are not regarded as passes, the passes on the eastern road must indeed be very high and difficult. My informant said that the distance between the western and eastern road was two days' journey. This can, however, only be the case at certain places, for the eastern road crosses the Sela-la, unless there are two passes with that name, which is not likely. Anyhow the two roads diverge from each other south of Sela-la.

The following names on the eastern road were given, although most of them are of little value, their surroundings and situation being unknown. From Namachang: Kechung-säri, a small mountain; Chabuk, small mountain; Yakchen-sumduk, mouth of a valley looking north, coming from the Pabla range or rather its eastern continuation, and being a tributary to the Tagrak-tsangpo; then follows the Sela-la or Se-la; south of it is a small valley, called Loma-tarchuk or Chesak; Marchem, a valley of which we have heard above as situated east of the Terkung valley below Sela-la; Nien-chungsa, a valley; Kungcha-la, a pass; between the ranges, in which the Sela-la and Kungcha-la are situated there is a river going westwards, obviously one of the tributaries to Bup-chu and Mü-chu; Laptse-karchung, a valley; Shingtu-navar, a plain with tents, — probably the same as Chingdu, so often heard of as situated east of our road; Pang-tebré, valley looking north, and coming from the

pass Takte-la, crossed by the road; Dem-tanar, valley looking S.E.; then the valley Sagung looking north and coming from the low pass Sagung-la; then the valley Kuju-tagma looking north; and finally the very high pass Pa-la, the highest of all on the eastern road. On its other, obviously S.E., side are Tsamalung and Tanak or Sta-nakbo, »the black horse», not far from the mouth of the above-mentioned tributary Ta-nakpo-chu.

Only a few suggestions can be made from this itinerary. One of them is, however, important, and, combining all the existing facts, I now feel inclined to abandon the assumption I maintained in my popular account,[1] where I regarded it as probable that the Sela-la and Khalamba-la were situated in one and the same range, namely the western continuation of the classic Nien-chen-tang-la, the existence of which was already known by the Capuchin missionaries. For it is more likely that the Pabla, from Sela-la, continues E. and E.N.E. in the direction of the S.W. corner of the Tengri-nor, but comes to an end before reaching so far. Goring-la and Khalamba-la are situated in the Nien-chen-tang-la, which from there continues to the W.S.W. Therefore the upper Shang-chu, from Khalamba-la to Namling-dsong is nearly parallel with that range, which sends down right tributaries to the river. Further W.S.W. the high and difficult Pa-la is a pass in the Nien-chen-tang-la, and the Ta-nakpo-chu is a comparatively short river. Still further W.S.W. Dangbä-la is a pass in the Nien-chen-tang-la, which then, somewhere east of Pa-la, ceases to function as a water-parting between the closed plateau-land and the Tsangpo. For already Pa-la is only a water-parting between Bup-chu and Ta-nakpo-chu, and Dangbä-la between Bup-chu and Rung-chu. In spite of there being only two principal ranges, the Pabla and Nien-chen-tang-la, there are, as on the western road, a labyrinth of ridges and ramifications, and south of Sela-la the road crosses four passes instead of one, namely Kungcha-la, Takta-la, Sagung-la and Pa-la.

Of some interest is the name Nien-chungsa as compared with Nien-chen, »the little and the great Nien», indicating that Nien-chungsa should rather belong to Nyen-chen-tang-la than to Pabla.

If my assumption is correct, the Nien-chen-tang-la is, west of Dangbä-la, pierced by Mü-chu-tsangpo and continues westwards along the northern bank of Raga-tsangpo to the neighbourhood of Amchok-tso, where it comes to an end. This explanation is more natural than my earlier belief that Khalamba-la, Sela-la, Chang-la-Pod-la and Angden-la were all situated in one and the same range, and that there should exist between the Mü-chu and Ta-nakpo-chu a meridional ramification or several irregular ramifications to the south or S.W. from Nien-chen-tang-la.

There is also a hydrographical indication that my theory is correct. For if we regard the northern tributaries to the Tsangpo, from Lhasa to Amchok-tso, we find that they decrease in length from east to west, which, of course, depends upon the fact that the range and the river-valley slowly diverge from west to east. The

[1] Trans-Himalaya, I. p. 267.

Ki-chu with its tributaries is the greatest of all. The Shang-chu is considerably shorter, and the Ta-nakbo-chu and Rung-chu still more so; the northern tributaries to the Raga-tsangpo are mere brooks. There is only one exception: the Mü-chu. But this is quite natural, for the Mü-chu is the only one of these rivers which is strong enough to pierce the Nien-chen-tang-la, just as, further west, the Chaktak-tsangpo pierces the Kanchung-gangri range. The Ki-chu, Shang, Ta-nakpo and Rung have their sources on the southern side of the Nien-chen-tang-la, whereas the Mü-chu comes from the southern side of the Pabla. The Bara-tsangpo and Ota-tsangpo certainly come from the northern side of the range which continues eastwards from Sela-la and which should be called Pabla in its whole length.

Regarding the whole profile from Ngangtse-tso to Ye the most striking thing is the insignificant difference between the altitudes of the different passes. We have: Pongchen-la 5 371, Sela-la 5 506, Shib-la 5 349, Chesang-la 5 474, Dangbä-la 5 250 and Ta-la 5 436 m. There is a difference of only 256 m between the highest and the lowest. La-rok should not be considered, as it belongs to the very front towards the Tsangpo where the great heights have ceased. The Pongchen-la belongs to a small range just south of Ngangtse-tso. South of lower Tagrak-tsangpo there is the range which I have called Ngangtse-range, for lack of a better name, and which probably, more or less uninterruptedly, continues eastwards to the Tengri-nor; if such be the case, it is pierced by Tagrak-tsangpo, Bara-tsangpo and Ota-tsangpo. The Sela-la is on the continental water-parting and therefore the most important of all, as well as the highest. The orographical rank of the Shib-la and Chesang-la is difficult to determine. We only know that they are situated on ridges which separate the tributaries of the Mü-chu from each other; and probably these ridges are simply ramifications from a high swelling or mountain knot of the Pabla at about $88^1/_2°$ E. long. Dangbä-la, as shown above, is most probably situated on the S.W. continuation of the Nien-chen-tang-la, and Ta-la on a southern ramification from the same. Such is also the case with the La-rok. It should be added that the Chesong-la may as well belong to a northern ramification from the Nien-chen-tang-la.

On account of the general evenness, the relative altitude of the mountains as compared with the valley decreases as we proceed upwards through the valley of the Tagrak-Naong-tsangpo. On the south side of the water-parting these relations cannot be noticed, as here we do not follow *one* valley down, but cross many valleys at right angles. Therefore the difference of altitude between every single pass and the valley below cannot be compared one with another. Taking the valleys south of the passes we find Camp 118 at 674 m below Sela-la, Camp 119 350 m below Shib-la, Camp 120 839 m below Chesang-la, Camp 122 341 m. below Dangbä-la and Camp 123 at 1 092 m below Ta-la. Only in the case of Sela-la, Chesang-la and Ta-la can an increasing relative altitude of the pass compared with the valley south of it be noticed, or 674, 839 and 1 092 m.

On account of the considerable height on the southern side of Sela-la, the climate in January is here almost the same as from Sela-la to Ngangtse-tso. On the high passes the cold was biting; almost always with clouds and wind. Some valleys are regarded as cold, others as mild or warm, probably depending upon their position in relation to the prevailing winds. The Sham valley is said to be warm, and indeed a kind of juniper, not higher than a bush, grows here. In summer no snow falls here, but often rain in abundance. The upper Rung-chu is a cold region. The Pema-nakpo is also cold and more snow than rain falls there in summer, sometimes even to a depth of one or two feet. At Dokang snow is very rare in summer; the rain falls in July and August.

Even in winter it is easy to see that the southern side of the Transhimalayan system is richer in rain than the northern. Every valley, even the small side valleys, have their beds full of ice, and springs are very numerous. All the water, from Sela-la to Dangbä-la, goes down to Mü-chu-tsangpo, and as the drainage area of this river is comparatively great, the Mü-chu delivers a considerable tribute to the Raga-tsangpo. The oceanic precipitation goes on diminishing from south to north, and the southern slopes of the Transhimalaya receive much more rain than the northern. Therefore again, the southern valleys are much more energetically and deeply cut than those which are directed towards the northern plateau-land. These differences will, however, be better understood on our second line of crossing.

As always in Tibet the population is scarce, but still more numerous than north of the Sela-la. At Sele-nang no nomads pass the winter, but in the summer they visit these high regions with their flocks, as can be seen from numerous stone-walls serving as sheep-folds, and remains at camping places. In a side valley near Selin-do nomads stay even in winter with their flocks of yaks. On the road to camp 119 four tents were pitched. In the valley of Sham near the road stone-huts were built at three places. In the valley of Pale there are 3 stone-huts. At a tributary of the upper Bup-chu the village of Sechen is said to be inhabited by ten families. Dochen, Lundup and Tamring possess each a few huts. Such is also the case with the valley of Chialung. Twelve tents at Ngartang remain the whole year, and at Kabalo we found 9 households of nomads and 3 of beggars. In the Pema-nakpo valley there are both tents and huts and great flocks in several places. In the valley of Rung-chu there are said to be several well populated places. At Dokang 9 tents were pitched.

As soon as we reach the plain of Ye a great change takes place, for here settled life in stone houses is the rule; there are numerous villages surrounded by fields of barley, and some little tree vegetation sets in. Monasteries are numerous.

To the east of our route the population seems to be very scarce, and we only heard of Chingdu as a place with many tents; but as these regions are much higher they would be too cold for winter pasture-grounds. The Transhimalayan system cannot be said to be a boundary between nomadic and settled life. It is true that

stone-huts are extremely rare north of the water-parting, but nomads are numerous south of it. Settled life on the Chang-tang can hardly be spoken of except at Dangra-yum-tso, Kyaring-tso and Tengri-nor and then at monasteries such as Serchik-gompa, Mendong-gompa, Lunkar-gompa and Selipuk and finally at one or two gold-fields as Tok-jalung. On the other hand the change from nomadic to settled life can be studied in the valley of one single tributary south of the water-parting; for round the upper course of the Bup-chu, for instance, nomads are living, while near the junction with the Mü-chu stone-huts will be found on the banks of the river. The higher the country and the more inhospitable the climate, the scarcer the population until it disappears altogether on the great heights north of Bogtsang-tsangpo. The most numerous population will be found in the deepest valleys as seems to be the case in the Shang valley where, to judge from the meagre reports we possess, one goes from villages and monasteries towards black tents, on the way to Khalamba-la. Such is also the case with the Mü-chu as wlll be seen presently. A map of the population of Tibet would show that by far its greatest part is settled in the valley of the Tsangpo and its tributaries.

Many meridional roads maintain the communication between southern or settled Tibet, the Tsangpo valley, and the great nomadic plains of Chang-tang. The one I have just described is one of the most important of all. As a rule it can be said that these roads become less and less frequented from east to west. The most important of all is the highway *viâ* Reting and Nak-chu to the country of the Sokpos or Mongolians, which, however, does not touch Chang-tang proper. Then we have the roads to Dam-largen-la and Goring-la and the Shang road *viâ* Khalamba-la. Next comes the road of Ta-nakpo-chu and Pa-la, of which nothing else is known than what I have reported above. Then the Sela-la road which I have described and which represents my first crossing of the system.

Travellers from Shigatse to Chokchu, a district on the western side of Dangra-yum-tso, use the Sela-la road, at least I met some caravans bound for that district. They may either go by Pongchen-la, east of Ngangtse-tso and to Ombo at the northern shore of the Dangra, or they may continue down the Tagrak-tsangpo and go south of Ngangtse-tso and Dangra-yum-tso, which would be nearer and more comfortable.

Proceeding southwards from Sela-la the road gradually becomes greater and more worn by traffic; it often consists of a hundred pathways parallel with each other, the result of sheep caravans. *Manis*, cairns and flags are numerous the whole way long, especially on all passes, river-crossings and at hot springs, but also between such places along the road. Approaching Ye such religious monuments become more and more common.

On account of the traffic wild animals are very rare; I never saw yaks, kyangs or antelopes south of Sela-la.

CHAPTER XXX.

THE SECOND CROSSING.

The direction of the second line across the system is very much like the first one, forming an angle towards the east. The starting point is situated a little above the village of Chaga, where the Dok-chu joins the Tsangpo, at a height of 4 013 m. The end point is Camp 150 on the bank of the Targo-tsangpo, and about two days' journey south of Dangra-yum-tso, where the height is 4 708 m. Here, therefore, we find some 700 m as the elevation of the plateau-land above the valley of the Tsangpo. Camp 150 cannot be many metres above the surface of the Dangra-yum-tso.

The highest point of this line of crossing is the pass Chang-la-Pod-la with 5 573 m. The distance from the starting point to this pass is, in a straight line, 106,7 km, and on my route 145 km, and the rise is 1 560 m. From the pass to the end point the distance is 72,4 km, as the crow flies, and 78,7 km on my route, and the difference in height amounts to 865 m. The highest point is also situated on the continental water-parting.

The road from Chaga crosses a little secondary pass, Tsikchung-chang before it reaches the junction of the two rivers. The river Dok-chu is formed by the function of the Raga-tsangpo with the Mü-chu-tsangpo. Its valley is well defined between mountains of moderate size and it keeps chiefly to the right or southern side of the valley, although it sometimes goes over to the northern, or, sometimes, follows the middle of the valley. The road follows the foot of the mountains along the northern side on the top of or below a terrace of clay, sand and gravel often pierced by dry ravines. Quite rudimentary sand dunes are sometimes seen, those situated in the angle between the Tsangpo and the Dok-chu being bound by vegetation. Changra, Yangyang and Dsho are short northern valleys coming from the crest of a ramification, not from an independent range; therefore all the northern valleys are very short and insignificant, and at the beginning of April, mostly dry. From the south enter the valleys Uri, Tseva and Tsa, the two last-mentioned with a common, broad mouth.

At a place called Chak-kera there is a path some 10 or 15 m above the river, on the slope, and used at high-water. The rock consists of grey granite.

At Tangna the height is 4 038 m. The fall of the valley is therefore not steep, although steeper than that of the Tsangpo. The Dok-chu forms a series of rapids amongst small granite blocks; but the rapids alternate with quiet, deep, and broad stretches; at some places the river is so much as 70 m broad, at the rapids only 20 or even 10 m. The greatest depths measured in the river were now 1,60 and 1,75 m. At some places the river is divided into two branches. The volume of water amounted, on April 6th, to 33 cub. m. a second. The Dok-chu is said to be at its highest in the end of July and beginning of August, that is during the rainy season. The pulsations of the river entirely depend upon the rains; in April the water-level is low. During the winter the river is covered with ice, at most places sufficiently strong to bear the weight of a man.

At Tangna there thrive a few poplar trees; peas, wheat and barley are cultivated, but the harvest is regarded as unsatisfactory and uncertain. From N. 15° E. the valley Naga comes down and from N.E. Dupda, both having one and the same mouth, and each carrying a brook; they are very short, not even one day's journey; in their background, however, considerable mountains are visible. Quite near, and N. 37° W. from Tangna is a mountain called Ponyung, and to the left of it, or in N. 55° W., is Pochung-seshung, a valley from the north. To the N. 63° W. we notice the mountains of Shakya, and to the west mount Chepo-richen. The south-western mountains are called Dambo-richen, along the foot of which the Dok-chu flows, just south of the village. Grey granite prevails in the whole region. Round granite blocks are extremely common all around the village and in the mouths of the Naga and Dupda. The road westwards from Tangna proceeds amongst such blocks and along fluvial terraces, cut through by many dry ravines; only Lungsang had a brook, crossed on a bridge.

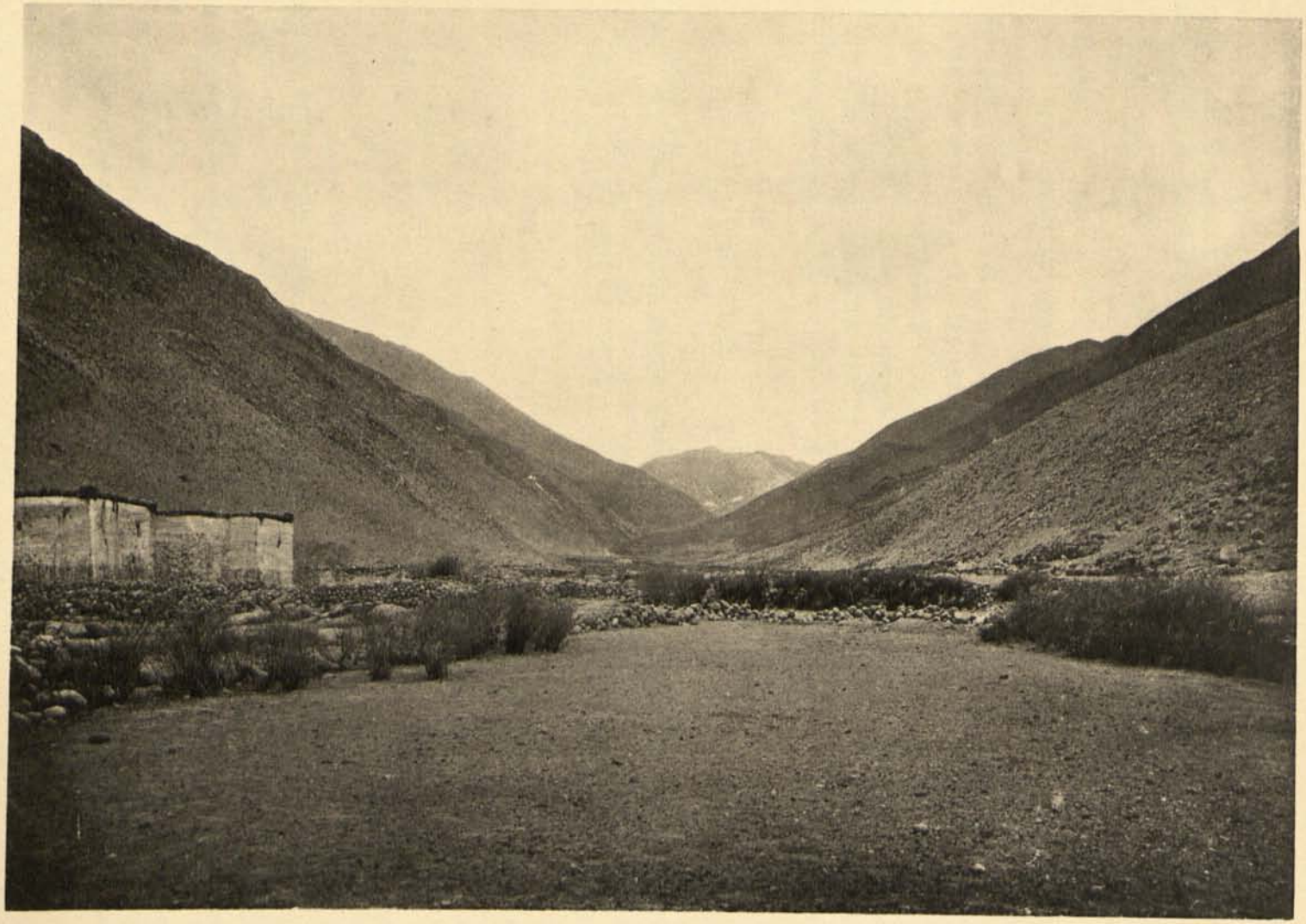
Sanga-pu is a valley from the south. The river Dok-chu goes as a rule along the southern or right side, only occasionally touching the northern, or following the gravelly bed in the middle. A part of the road goes amongst hills of clay, ravines, terraces, and accumulations of fine detritus products from the granite; the valley is rather narrow and irregular. Along the western banks of the ravines there are ordinarily rudimentary dunes of sand. The tributary valleys from the north are longer than those from the south; their sources cannot always be seen, but often the crest from which they come, that is to say either the Nien-chen-tang-la itself or a ramification from the same. On the other hand the origin of the southern tributaries is always visible just under the crest of the range which is situated between the Dok-chu and the Tsangpo. The northern slopes of that range are partly covered with snow. One of the valleys from there is called Sangdo-pu.

The valley of the Dok-chu is thus bounded by two ranges, the crests of which are not far from each other. The crest of the southern is, however, nearer than that of the northern, and therefore the mountain slopes, at the left side of the valley, are more gradual and moderate.

At some places great granite blocks are seen in the bottom of the valley, especially at Machung. Gortsang is a northern valley more considerable than the rest; it has a brook in two branches with two bridges, near Machung. A small northern valley is called Saukpa, opposite which the valley of Chamda has some snow in its upper part. The ground of the main valley is soft and has some grass vegetation. At a widening the Dok-chu is divided in three branches, one of which sweeps the foot of the granite rocks at the left side, forcing the summer road to ascend the rocks at Berü-chang, as the high-water fills almost the whole bottom of the valley. Another place of the same kind is called Sibri, where the Tanglo and Yamdang valleys enter from the south. The bottom of the main valley is here covered with gravel and sand, sometimes forming rudimentary dunes. The granite rocks on both sides are now very steep, often perpendicular, and the whole landscape is more accentuated. The surface of the granite is often polished or formed into hollows and soft, rounded ridges by the action of erosion at earlier periods.

At Lingö, Camp 137, where there is some cultivation, the height is 4 070 m, indicating a very moderate rise since Camp 136. To the S. 23° W. enters the valley Doglo; to the S. 48° W. is a small peak called Deru or Düri with a ruin on its top. The valley Dok with the Dok-chu, or, as it is called further west, Ragatsangpo, comes almost straight from the west. The Dok-chu at Lingö is said to be unfordable in summer. In winter it remains covered with ice, which only after severe cold is strong enough to bear men and horses.

At the junction the Dok-chu forms a delta of three or four branches with small rapids, whereas the Mü-chu is more quiet; this is one of the causes why the Mü-chu should be regarded as the main river and Dok-chu as a tributary. On the other hand the Dok-chu dictates the direction of the joint valley. A measurement of the volume of water proved to be unreliable; it was made at a place where the Mü-chu was divided in two branches, carrying 14,57 and 15,11 cubic metres or 29½ cub. m. together, only 3½ cub. m. less than the joint river the day before. Later on I found that some water from the Dok-chu joined the Mü-chu already above the junction, and therefore the above volumes are unreliable. If the configuration of the country alone be considered, I find it very likely that the Mü-chu under all conditions must be much stronger than the Raga, for the regions from where it comes are high and rich in springs and tributaries; the Raga, on the other hand, comes from comparatively lower parts of the Transhimalaya, which receive less precipitation. To judge from Ryder's map the northern tributaries of the Raga are very short, and such must be the case also with those from the south; many of these short valleys are probably dry in the beginning of April. On the long way from Ragatasam to Lingö the river does not receive a single tributary worthy of mention, and much of its own water must be lost by evaporation and filtration in the soil. A future examination at different seasons will probably prove that the Mü-chu is always the greater of the two, as coming from regions more exposed to precipitation.



One of the tributary valleys to the Mü-chu.

The name Raga-tsangpo is hardly known at Lingö; the joint river, as well as the western river, are both called Dok-chu. Generally the natives have very diffuse ideas about the origin of the rivers. Asking where the sources of the Mü-chu are situated, one gets the answer: in the Chang-targo mountains, which means: in the Targo-gangri of the north.

Remembering the orography of the first crossing, where Dangbä-la is situated in a range which for good reasons I regard as the western continuation of the Nien-chen-tang-la, and thus on the water-parting between Bup-chu-Mü-chu and Rong-chu, one could not expect to find any considerable tributaries to the Mü-chu from the east, until many days' journey northwards. Such is also the case; the main valley is very sharp cut, the tributaries insignificant. The Mü-chu valley is narrower than that of the Dok-chu, as the Mü-chu is a transverse valley, piercing ranges, whereas the Dok-chu is situated between and parallel with two ranges.

In the lowest part of its course the Mü-chu keeps to the right or western side of its valley; at its left side heaps of big granite blocks are spread at the foot of the rocks; only just before joining the Dok-chu the river crosses its valley diagonally to the left side and flows along and amongst the blocks. So far as the Dok-chu or Raga can be seen westwards it also keeps to the right side of its valley. The two last southern tributaries to the Dok-chu are Pangyu and Dachü, and the last northern is Sangi.

In the Mü-chu small rapids alternate with deep, broad and quiet sections, and the general fall is slow. Sometimes the road keeps some 10 or 20 m above the bottom of the valley, sometimes on the top of the left side terrace. Chisu is a valley from the east, Ok-tsangma a part of the main valley with barley fields protected by a stone wall; Kao-chirang is a valley from the west, as usual, short and steep; Pukpe-taglung is a grotto at the left side of the valley, Kabu a wide but short valley from the west, with a brook. The valley of the Mü-chu is here very regular; it sometimes looks almost like an artificial channel. The breadth is about 35 m. An iron chain bridge, called Tokcha or Ducha, crosses the river here. Narrow belts of ice follow both banks at one metre above the present level of the river, indicating a considerable fall of the water. At the right side of the valley, below the mouth of the Kabu, the erosion terrace has a height of some 30 m. From the east enters the valley Taka. Grey granite prevails the whole way, sometimes interrupted by diabas-porphyrite or schist.

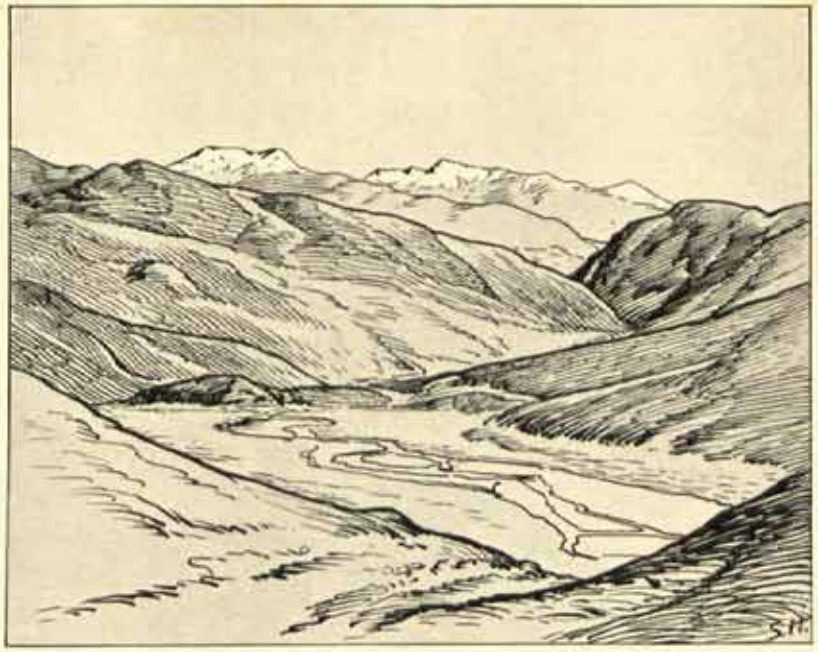
At Tagmara and higher up the river has mighty terraces on both sides. The valley is deep cut and well worked out by the river. The mountain masses east and west are of the same moderate height, but compact and solid. Ege-tang is a ridge of quartzitic schist, above which the granite crops out again.

Finally Changulung enters from the west and Tongdung-pu from the east; in the mouth of the latter there is a juniper of unusual dimensions. From N. 30° E. enters the valley Tongchen-pu. Tong is the name of the whole region round Camp

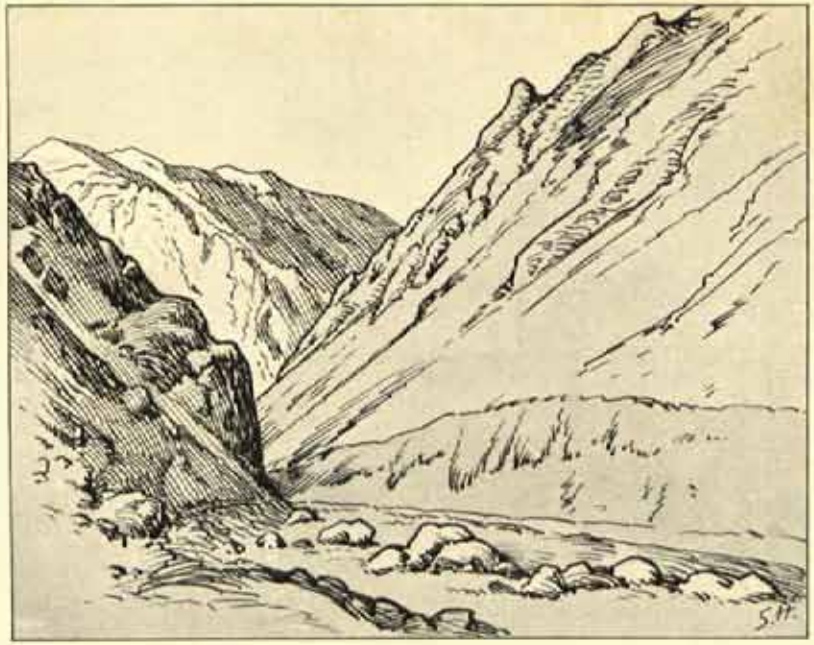
138, where the height is 4 167 m, although the village and the monastery are situated at a considerable height above the bottom of the valley. Some of the surrounding mountains are of considerable height, as one to the S.E. and another S.W. called Takpo-che and falling steep down to the Mü-chu valley at Tong. To the N. 86° W. is a rocky massive at the side of a right tributary called Kanin-lungpa; to the N. 62° W. is a rounded peak, Ya-munja between Mü-chu and a right tributary; at a greater distance N.W. is the peak Ya-metsik with some snow. The mountain at the southern foot of which the monastery, Lung-gandän, is built, is called Ya-yüra. From N. 80° E. enters a valley Tong-pu-chen which is separated from Tongchung by mount Tovakü. The village Tong is built on the terrace of gravel and blocks which has its root in the mouth of Tong-pu-chen; the fields are amphitheatrically arranged like a staircase down the slope; bushes and poplar trees are not rare.

Northwards from Tong the valley of Mü-chu remains as narrow as before; the rise is slow, the river seldom forming rapids. The fluvial terraces are well developed the whole way up, especially at the right or western side, where they are 30 to 40 m high. Granite prevails. From the west enter the tributaries Tina and Tso, both of them having fairly high snowy mountains in the background, making the impression of a crest parallel with the valley of the Mü-chu. Hlelung-pu comes from the east and has also a little brook from snow-fields and springs. Lingbo-pu is also a valley from the west with a sharp ridge in its background. Ghe-pu is a comparatively big valley from the east; in its upper regions there is a partly snow-covered massive called Tsa-la, a name which rather indicates a pass. In the region of Ghe the Mü-chu is said to be at its greatest in the beginning of August when it can nowhere be crossed. Here the right or west side of the Mü-chu valley is rocky and steep, the left has more gradual and rounded slopes. As a rule the river follows the middle of the valley, only forced by the fans of the tributaries to turn over to the opposite side of the main valley. Thus for instance the Ghe valley and its fan press the Mü-chu over to the right side of the main valley.

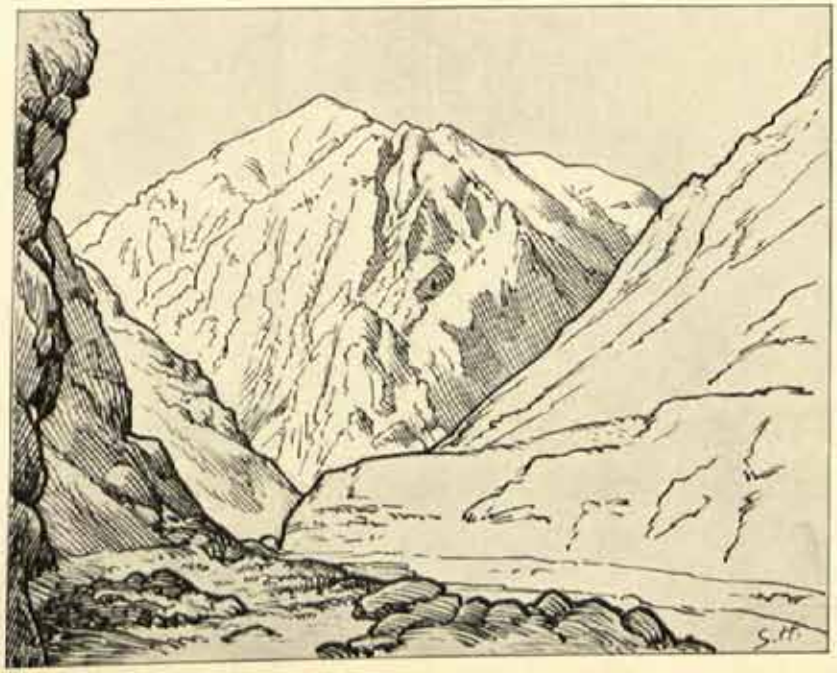
On the section from Ghe to Sirchung we notice the following left tributaries, i. e. coming from the east: Tangma, which has a brook and in the surroundings of which grey granite stands in living rock; Rogam, which is very small; Chepu, a considerable valley coming N. 87° E., with a local road to its upper part, but not to a pass; it has many small side valleys, the openings of which are seen some distance upwards; Shavo or Shao and Ship are small valleys; Gilung opposite to Sirchung is comparatively great, although it is said to be only two days' journey to its origin at Nere. Above Nere is the pass Chang-la, beyond which follow the regions of Ngartang and Ye-pu; Ngartang is my Camp 122 between Dangbä-la and Ta-la, and Ye-pu the upper region of Rung-chu. The information is so far interesting as it proves there is a direct road from Sirchung to Ngartang, some three days long and crossing the water-parting between Rung-chu and Mü-chu in a pass, Chang-la



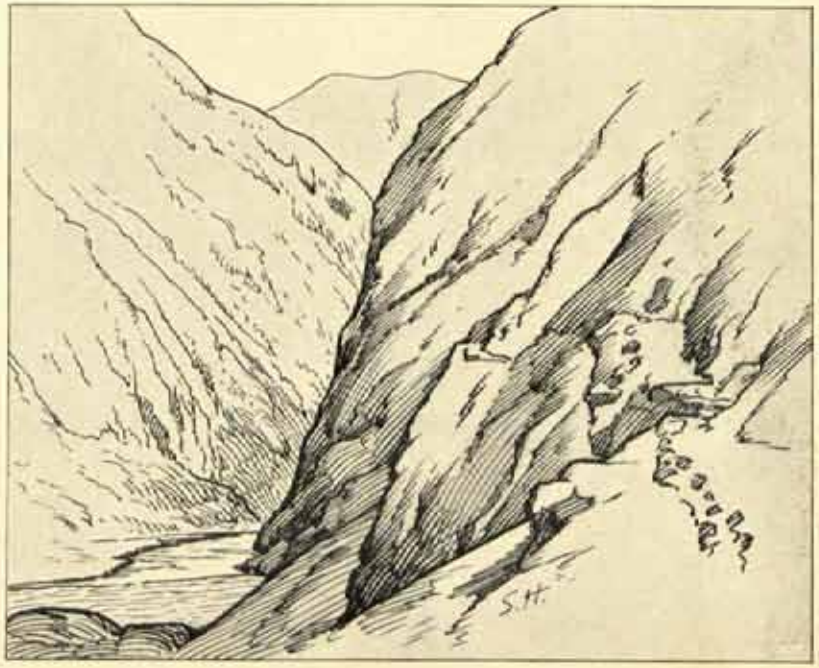
Looking up the river from a point below Lehlung (April 12).



Looking up the river (April 13).



The same, higher up the valley.



Tigu-tang (April 13).

Lung-gandän-gompa in the Tong valley.

Lung-gandän-gompa in the Tong valley. (continuation to the right of the preceding photograph).

A house in the valley of Tong.

which must be situated quite close to Dangbä-la; at any rate the Chang-la must be a saddle in the Nien-chen-tang-la.

The right tributaries on the same section are: Tsasa; Sanak-pu which is a considerable valley coming from S. 60° W.; it has the same size as the main valley, although much less water, and its fan forces the Mü-chu over to the left side of the main valley. In the background of Sanak-pu a range is seen covered with some snow. Then follows the Dera valley coming from N. 80° W. where black, rocky mountains are seen. The rocks at its mouth and higher up at the right side of the main valley consist of porphyry. Töngbuk and Tinga are small valleys, each with a brook.

The rise of the main valley becomes gradually somewhat steeper and ordinarily the river forms small rapids, between which the quiet stretches become more rare and shorter. One of them, opposite Shavo, where the road crosses the river, has a breadth of 95 m and an average depth of 1 foot; here the valley is fairly broad, otherwise always narrow and deep-cut. Two stories of terraces are generally developed, one old at 30 or 40 m above the present bottom of the valley, and one recent, being from 2 to 5 m high. Sometimes the road is laid on the top of the old terraces, but generally it proceeds between the old and the new ones. They are much interrupted and pierced by all tributaries. The Chepu brook, which carries comparatively much water goes out in the main valley through a narrow gate in the terrace of gravel and shingle, and is itself provided with 10 m high terraces. All the villages are situated at the mouths of the tributaries, where the ground is favorable for irrigation purposes. The bottom of the main valley is full of gravel of granite and porphyry, and occasionally of sand and blocks.

What the country is like some three days further east we know from the first crossing, *viâ* Sela-la, although it is completely unknown still further east. It is more difficult to form an idea of the orography in the country west of Mü-chu. Some considerable tributaries come from the west, and in the background of every one of them fairly high mountains are to be seen. It is true that one gets the impression, that these mountains all belong to one ridge, which, under such conditions, should be a meridional, southern ramification from the Pabla range. But comparing the region in question with the general orography in the rest of central Transhimalaya, the existence of meridional ramifications of any length seems to be very unlikely. The existence of two east-west running ranges is beyond doubt, the Pabla range and the Nien-chen-tang-la range, the latter following quite close the northern bank of the Raga-tsangpo and continuing westwards beyond Amchok-tso, as is also in accordance with Ryder. There may exist a third, small range between these two, but it is more likely that the intermediate space is filled with ramifications from the two principal ranges. This question can only be solved by new exploration in the region between my second and third lines of crossing.

Above Sirchung the following valleys enter from the left or eastern side: Tsiglung or Tsigelung with brook and bridge and cut through mica quartzite which

prevails a long distance upwards; a nameless valley with a well developed fan cut through by its brook; as a rule the mouth of every side valley is filled with and sends out a fan of gravel and shingle, deposited at an earlier period, and cut through at the present time; the front of every fan is generally steep as it has been eroded by the main river. Shugutsar, Kita and Lungmar are small valleys in a region where the living rock consists of diabas. Then follows the Samo valley.

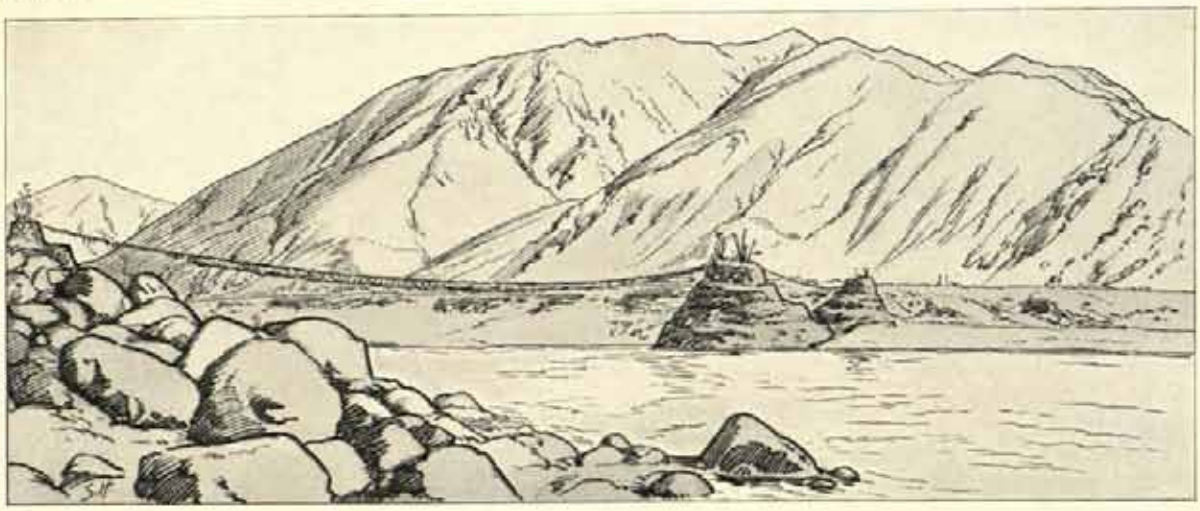
The tributaries from the right or west side are, on this section of the road; Jamo, of considerable dimensions, although short, and with a ridge of black mountains in its background; Gumbu, a small valley; Panchung and Panchen, both coming from a mountain covered with some snow; and finally Kating, where the height, at Camp 141, is 4 229 m.

On this section the Mü-chu runs from N.W. to S.E.; from Sirchung to a little beyond Ghe it flows south, and then again S.E. to the junction with the Raga-tsangpo. As a rule the Mü-chu here follows close to the left side of the valley, where the mountains are steep and the side valleys short and insignificant and generally without names. The terraces have the same characteristics as before, 30 to 40 m high, and best visible near the mouths of the tributaries. The road often goes on the top of this terrace, which is cut through by many ravines. The main valley is very narrow. Sand is common, but only on the leeside of such objects as *manis* or edges of ravines, fragmentary dunes are formed, or rather accumulations of sand.

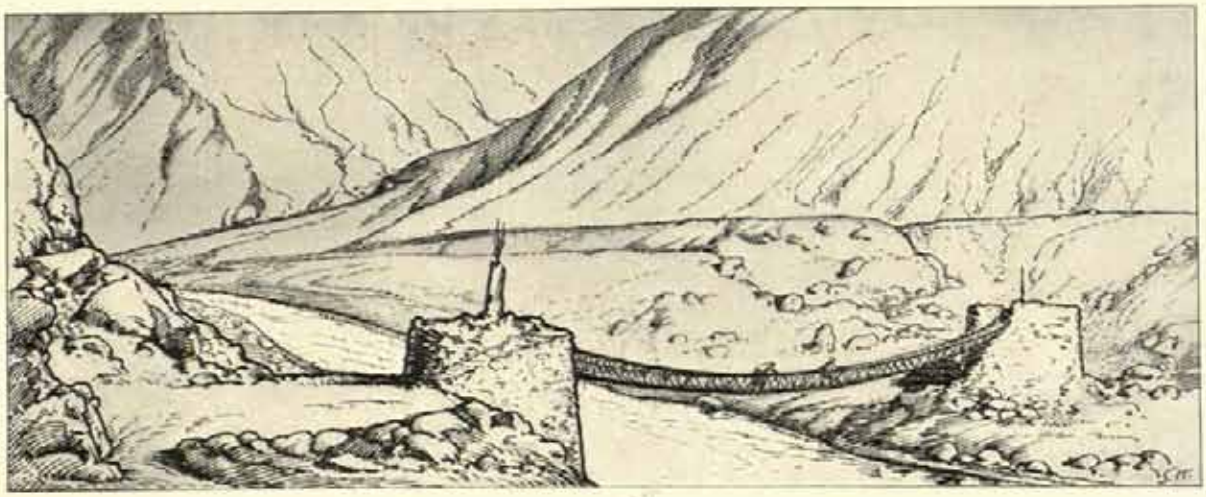
On the next section, up to Linga, the mouths of the following left tributaries are passed: Ngalung, a small valley, but with a considerable fan pressing the main river over to the right side. This alternating of left side and right side fans pressing the main river over to the other side, is a characteristic feature which becomes more and more developed. Opposite every fan the side of the valley along which the main river flows, is generally bounded by steep mountains. After a series of quite small valleys follows the Tongyang which is considerable and has a brook cutting a deep furrow through the fan; the upper part of this valley is bounded by high, rounded hills. Then follows from the east the valley Gok-shung, and finally the greatest of all the tributaries to the Mü-chu, perhaps with the only exception of the Raga-tsangpo, namely, the Bup-chu, here also known under the name of Sha-chu. The valley of Bup is broader and more open than the valley of Mü, which is not surprising, as the Bup-chu is, undoubtedly, situated between and parallel with two ranges, whereas the Mü-chu cuts its valley at right angles across the ranges. Therefore the Bup-chu is chiefly a tectonic valley, whereas the Mü-chu is erosive.

Comparing the two rivers we find that the one comes from the N.W., the other from the N.E., both having their sources on the continental water-parting of the Pabla range and joining at Linga. Therefore it is hard to tell which of them should be regarded as the main river. At the confluence the Bup-chu had, April 15, a volume of $6._{09}$ cub.m a second, and Mü-chu $6._{29}$ cub.m. Thus the Mü-chu was

In the valley of Ghe.



The Tsangpo-bridge at Chaga.

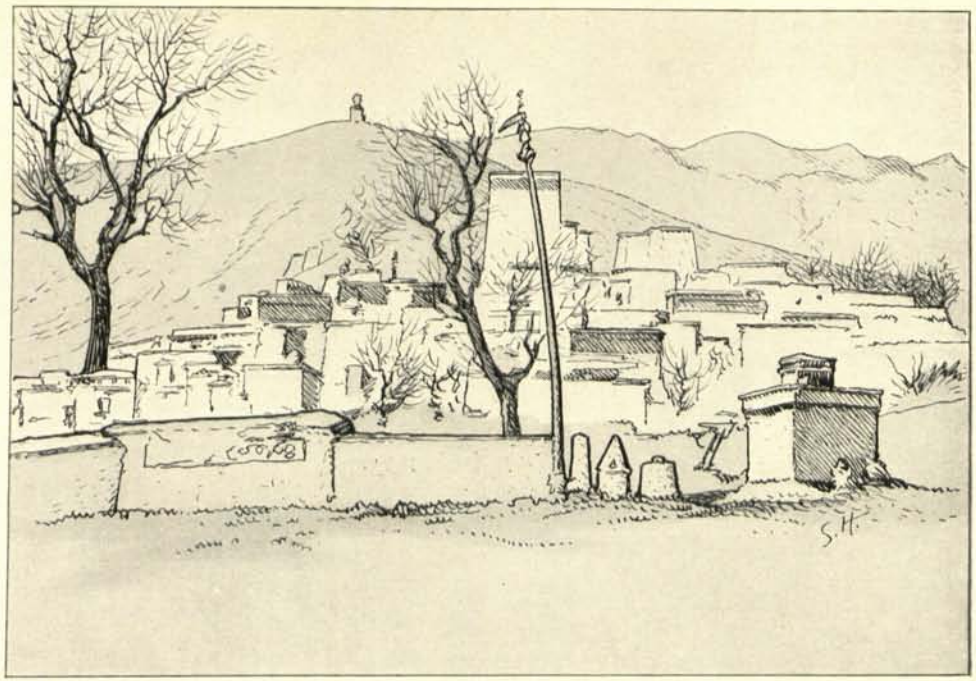


The bridge over the Mü-chu (April 8).

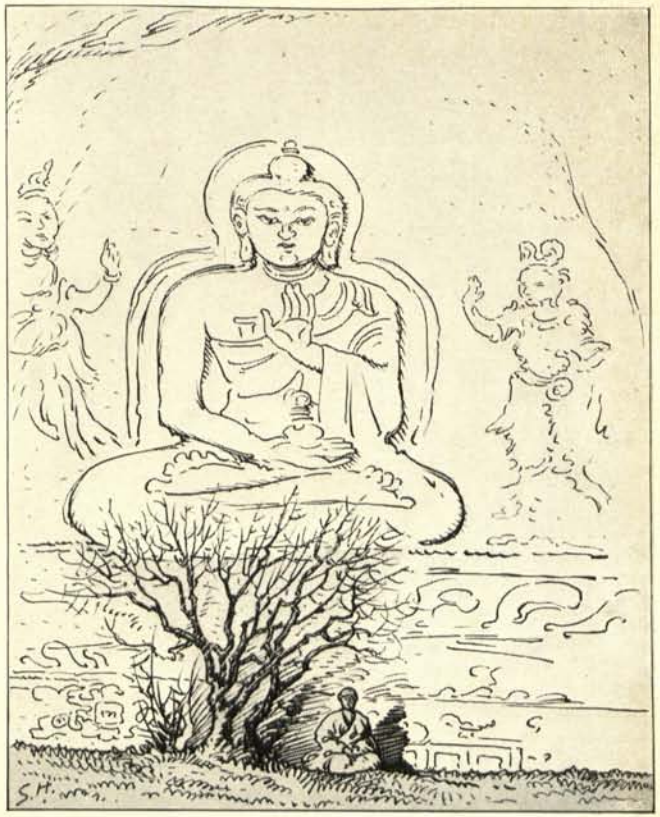
Camp 141, Kating.

My camp at Kating in the valley of the Mu-chu-tsangpo.

In the Mu-chu valley, at Kating.

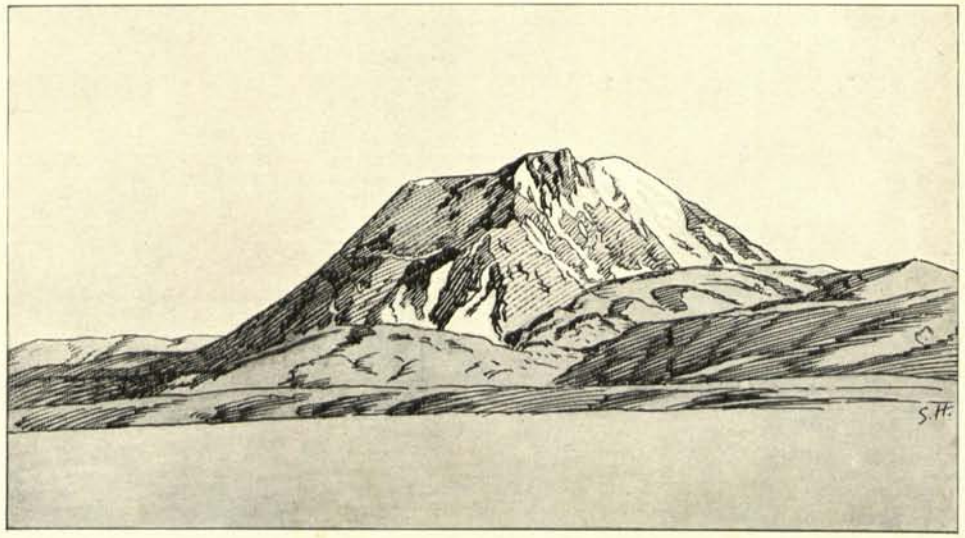


TASHI-GEMBE-GOMPA.

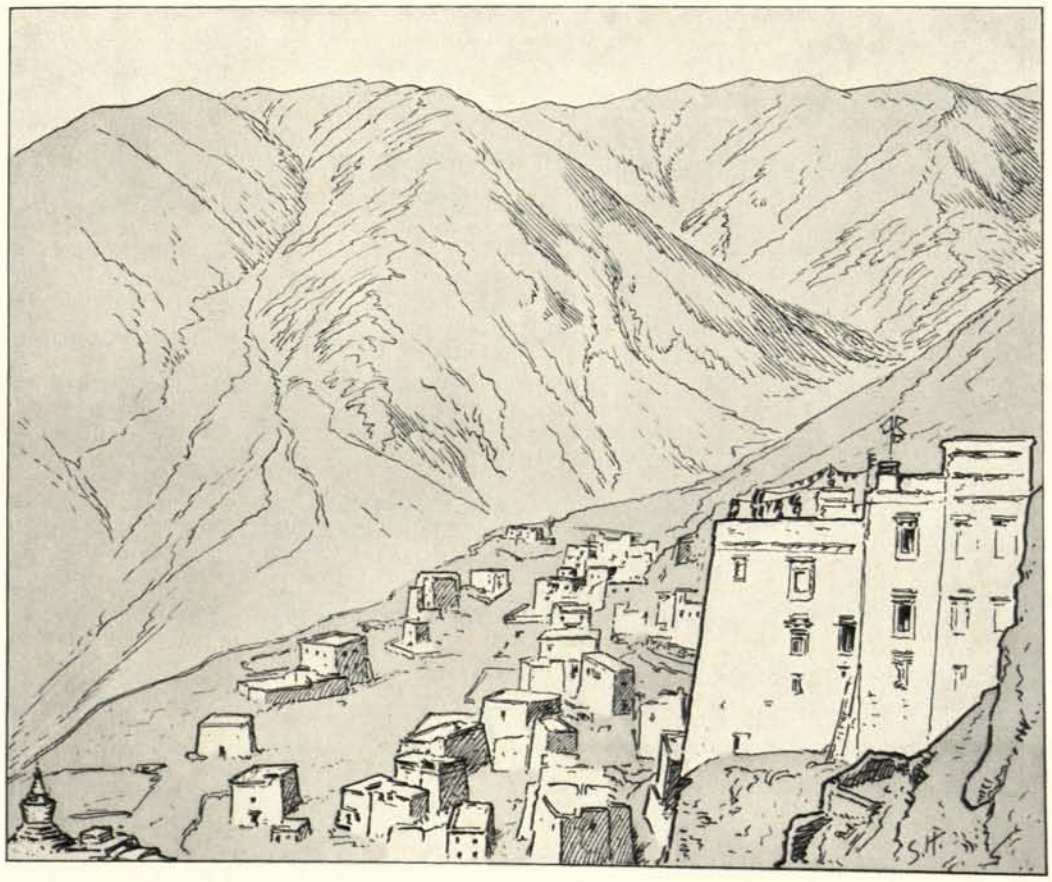


A BUDDHA-SCULPTURE IN GRANITE AT LINGÖ (APRIL 7).

SAMDE-PUK, BELONGING TO LINGA.



DO-TSÄNKANG FROM CAMP 153.



Two views of the temple-village Linga-gompa.

a trifle greater. Other factors, telling in the favor of Mü-chu are the direction of the joint valley, which is the same as that of Mü-chu, and the fact that the Bup-chu forms small rapids at the junction, thus being situated at a somewhat higher level; finally the name Mü-chu, belonging to the lower course of the north-western branch, and remaining as the name of the joint river as well. Therefore the Bup-chu must be regarded as a tributary, and it seems to be the greatest one of the whole system, as the Raga-tsangpo has its sources in comparatively low mountains. During the high-water period, when both the Mü-chu and the Bup-chu are very swollen, the Mü-chu is said to be the greater of the two.

From the right or western side of the same section we notice the following tributaries: Tagelung, Yondar and Rung, all with small brooks and fairly high mountains in the background, just as the case has been with most other right tributaries further south. Chupsang and Tugang are small valleys. Lenjo is a very considerable valley, next after Raga-tsangpo the greatest of all from the west. The view towards its upper reaches is soon closed by mountain shoulders cropping out from both sides; one of its higher tributaries is called Shugelung. At least one third of the volume of the Mü-chu comes from the Lenjo and its river has to be crossed on a solid and well built bridge. Possibly this river also comes from the continental water-parting, although the only information I could get about it stated, that a road went from its upper course to Chang-la-Pod-la, and not to any other pass. Finally Talung is a small tributary from the west.

The main valley itself is here deep cut and narrow between steep mountains where living rock is very ordinary. Near Tongyang we have quartz-porphyrite, and a little higher up plagioclas-amphibolite. Opposite Talung, at the left side, stands diabas-porphyrite and ortoclas-porphyry in very steep, sometimes nearly perpendicular walls, and a little higher up phyllitic schist appears; at a passage called Tigu-tang quartzitic sandstone forms the rocks.

The terraces are as before. Near Tagelung they appear in three stories very well marked at the right side of the valley, whereas at the opposite side the rocks are clean. Sometimes the road is at the top of the highest terrace, 40 or 50 m, with the river in its deep narrow bed below, but after a while it again approaches the bottom of the valley or is built on the top of the lowest terrace, a few metres above the river. The valley is full of gravel and blocks of all sizes. At Tigu-tang near Linga, the road ascends above solid rock at the right side.

At Linga the height is 4 302 m.; thus the rise of the valley is on this section somewhat steeper than before, and rapids are more common, although some quiet and deep passages alternate with them. The breadth of the river remains very much the same or about 20 m. At a place on the right side it was easy to see, from water marks, that the high-water of Mü-chu used to rise more than 3 m. above the level in the middle of April. Even if travellers and caravans, at this place, have to walk through water one foot deep, they prefer the inundated road to the

uncomfortable, roundabout road over the western ridge, which, however, has to be used if the river rises more than 3 m. At Linga the Mü-chu is spanned by a long bridge.

From the terrace slope on which Linga-gompa is built, one sees to the north the mountains round Donglung, where the valley and the road turn in a right angle to the west. To the N. 38° E. is a little valley called Kipuk, and N. 65° E. a mountain called Pongra. Due east is a mountain called Luchen in the background of Bup-chu. Yavo is a right tributary to the Bup-chu. To the S. 50° E. is mount Gäbri, and to the right of it the valley Tsalung.

Above Linga the valley is generally as before, only at one place, Takar-tang, is it wide; at Linga, the Bup-chu junction, the breadth is considerable, but higher up the valley is sometimes as narrow as a gorge. From the left or east enter Kipuk-nima and Melung-pu with slightly snow-covered mountains in the background. Donglung-pu is the next. From the right we have: Niense-pu, the brook of which is divided into two branches over the fan, and each has a bridge. Koruk is a valley with some snow; then follows the Rechik; Chinchik is small, Langmar-pu is more considerable. Here the height is 4 331 m, at Camp 143.

Not far above Linga the rock consists of phyllitic-quartzitic schist; at the right side, opposite Tabu, and at Lang-metang the rock is pegmatite. A compact mountain at the right bank, called Takar, forces the river to the above-mentioned bend, Takar-tang. The terraces are 20 to 25 m high; blocks of all sizes are very common.

On the section between Langmar and Govo a great change takes place, for the valley, which so far has been meridional, now becomes latitudinal, running from west to east, parallel with the stretching of the great water-parting range to the north; the northern or left tributaries therefore now come directly from that range and not from ramifications. These left tributaries are: Pukchung and Pukchen situated between high but rounded mountain groups and ridges; Ke-tsangpo, the greatest of all tributaries above Bup-chu; it is also called Ogorung-tsangpo, although this name by some informants is only fixed to its upper course or perhaps to a branch in its upper part. Ke or Ker is a village near the junction. The mountains at the western side of lower Ke-tsangpo are called Namnam, those to the east Ami-ri-rung. So far as can be seen the Ke-valley comes from N. 10° W. and is regarded as a tributary to the Govo, although now, in April, the Ke had much more water than the Govo, which also forms rapids at the confluence; in the summer the Govo is said to carry more water, which is doubtful. Above the junction the Govo had now hardly $1^1/_2$ cub.m. water left. At any rate the Ke and Govo meet at Namnam-sumdo and form the Mü-chu; at the junction the Govo-tsangpo is spanned by a bridge. So far as can be seen from the junction the upper reaches of Ke or Ogorung-tsangpo are surrounded by considerable mountain masses, being parts of the Pabla range. The river is said to be formed by the brooks from several high valleys, and one and a

The valley of Mü-chu south of Linga.

The temple Pesu, a part of Linga-gompa.

Linga-gompa. In the foreground the valley of Mu-chu.

The bridge over the Mo-chu at Linga.

On the way to the high regions of Transhimalaya; near Linga.

The village of Govo.

Looking up the valley of Govo in the direction of Chang-la-Pod-la.

half day's march is reckoned to the sources. The distance to Chang-la-Pod-la is also one and a half day's march. This is in accordance with the stretching of the water-parting range, for, from the situation of the passes I have crossed its direction is E.N.E.—W.S.W. The distance to the Ogorung sources must, however, be shorter than the distance to Chang-la-Pod-la, as the road is probably much more uncomfortable. The water-parting range to the north which, further east, has the local name Pabla, is here called Kongmo. There are said to be no rocky mountains and peaks with eternal snow at all, but only high, rounded hills, covered with good grass in summer. Ke-shinglung is a small right tributary to the Ke, coming from the N.W. At Govo a northern tributary comes down from N. 20° W. under the name of Govo-pu; in its upper parts high, snowless mountains are visible; its brook irrigates the fields of Govo. This brook is called Govo-chu and is regarded as the upper course of Govo-tsangpo. The main river itself, which comes down from Chang-la-Pod-la, has the name of Pashu-tsangpo.

The right tributaries are: Geju with a brook irrigating the village Geju; this valley is cut through pegmatite. Chogelung-ongma and Chogelung-kongma with frozen brooks fed by springs. All the right tributaries were now April 18th, frozen, as being more protected from the sun. Chivu-gang comes from a fairly isolated mountain. Demolung, the ice of which formed real cascades far up in its valley; and finally Por-tsuk coming from S. 20° W. and with very powerful mountains in the background, amongst them a snow-covered peak. Por-tsuk and Govo-pu open at Govo; there are no roads in these tributary valleys which are said to be full of gravel and blocks.

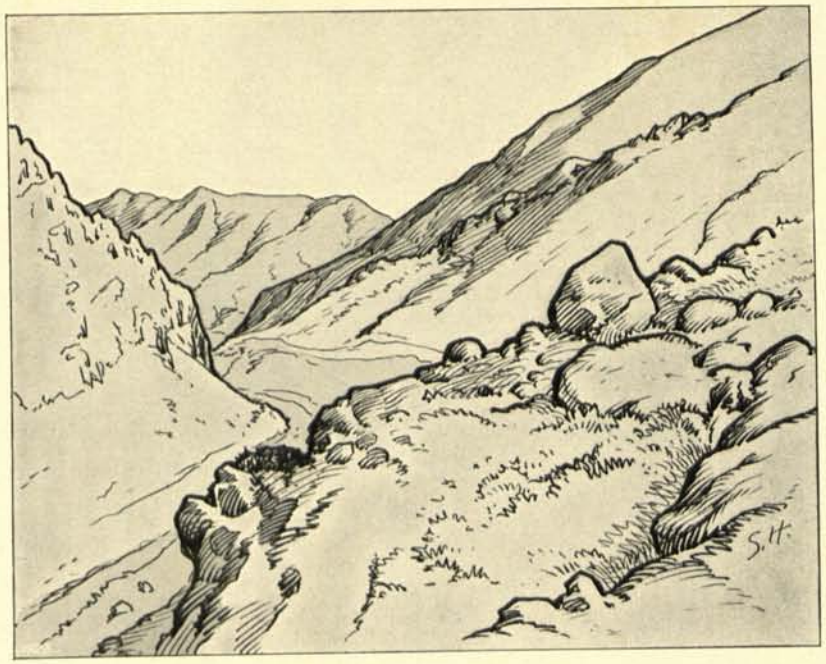
The main valley remains narrow and is provided with sharp terraces in several stories up to 50 m high. Sand is common, and a ridge between the Mü-chu and Langmar valleys, as well as several other slopes in the neighbourhood, are sand-covered. Blocks of pegmatite are very common, a few of them real giants. The mountains on both sides are partly steep rocks, rising from the screes of detritus, partly soft rounded hills. Chemchung-tang is a place where the rocks slope steep down to the valley, and Döle-taka is a pegmatite rock on the left side. As a rule the mountains to the south are rocky, wild and low; to the north high and more massive. Looking westward from the neighbourhood of Govo the northern ramifications and shoulders show themselves beautifully, stretching southwards to the main valley and dictating the windings of its course; the river usually keeps to the left side of the valley.

Dönchung-taka is a terrace-plain, where caravans generally camp. Higher up the valley becomes more open. The rise is steeper; at Govo the height is 4 524 m., and the river forms rapids the whole way. The village of Govo, which is the last on the way to Chang-la-Pod-la, has the ordinary characteristic situation on the fan of the Govo-chu, and with its barley fields on a lower terrace, irrigated by the brook of Govo-chu.

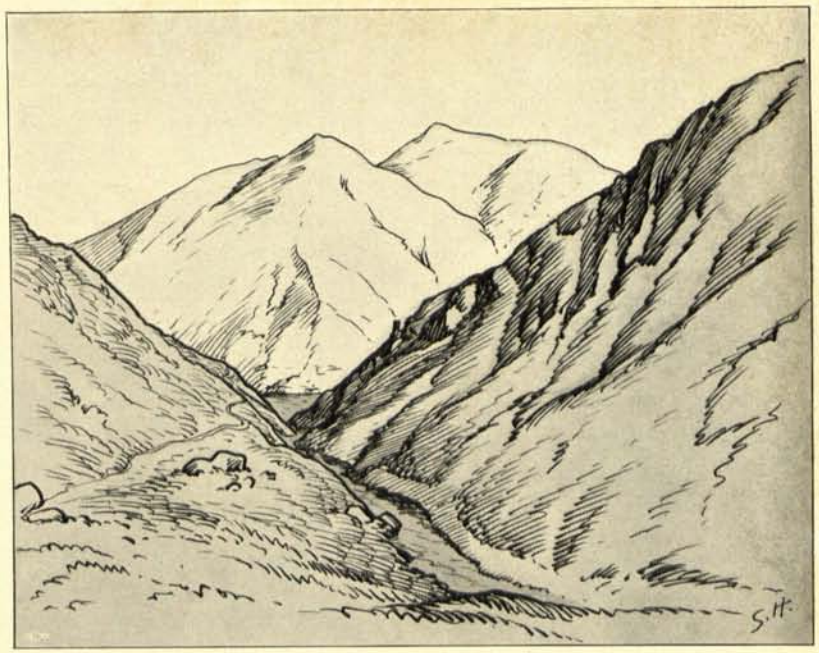
From Govo to Chomo the next section of the valley rises from 4 524 to 4 795 m., whereby, however, Govo is situated some 25 or 30 m. above the bottom of the valley. On this section the habitus of the landscape becomes more alpine, and the climate colder. The tributaries from the left or northern side are: Sulung, between steep granite rocks; Leblung, a rather big valley, probably coming from the continental water-parting; Chakcha, a small valley or rather gorge; Popta, also very small; Chagelung, of moderate size, but much hidden by the terraces in the main valley. Ogolung is a big valley in the upper part of which a high range is seen, obviously identical with the Pabla and being at a distance of some 6 km from the road; it has some snow along the crest, and probably greater snow-fields on the northern side. There is no road in this valley, except for hunters and shepherds. Changlung is the next valley, of moderate size. Delung is greater, and through its entrance the Pabla range is seen at a short distance north. Kurlung is the next, and the last is Yumbo, between which and the main valley stretches a low granite ridge.

From the right or south the following valleys enter: Tsari, which is small and steep and coming from mount Tsari; Panglung is more like a low depression or furrow between the soft, rounded hills which bound most of this section on the south. Lungchen is a greater valley coming from mount Tsari, two sharp and partly snow-covered peaks of which are visible in its upper part. The mountains at the head of Lungchung are free from snow. The higher mountains visible through the openings of the right tributaries seem to belong to one considerable ramification from the Pabla range. Talung is a large valley with a peak in the background; the ice of its brook fills the whole bottom of the valley and forms real cascades of ice over the front terrace. Toglung has cut down its course between almost perpendicular, low granite rocks, above which the soft, rounded hills begin. The Tagelung valley is almost hidden by the front of the terrace in the main valley. Kelung is a steep valley. The Pashu or Dönlung valley is the greatest of all; in its upper part is again seen the southern range. This valley is of more considerable dimensions than the main valley which we follow to Chang-la-Pod-la, and it gives its name to the river, Pashu-tsangpo, down to Govo; above the junction the river which is followed by the road is called Dosum, and the place where this river joins the Yumbo is called Chomo-sumdo or »the meeting of three valleys»: Dosum, Yumbo, and their resultant. The Pashu-tsangpo comes from the pass Bogbo-la which is situated on the continental water-parting.

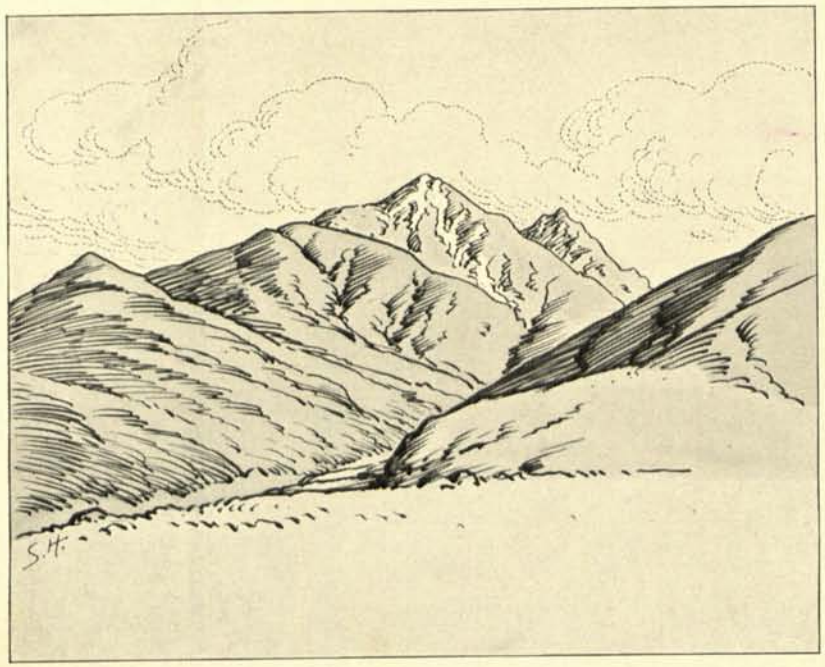
Granite prevails along this section. The bottom of the valley is full of blocks and gravel. The terraces are mighty, and often pierced by the tributaries, but sometimes uninterrupted even where tributaries enter; at such places the brooks form cascades of ice hanging down from the top of the terrace. The river streams in a deep grave between its 50 m. high terraces, which are often very regular. The road either goes on the top of the terraces or down in the bottom of the valley;



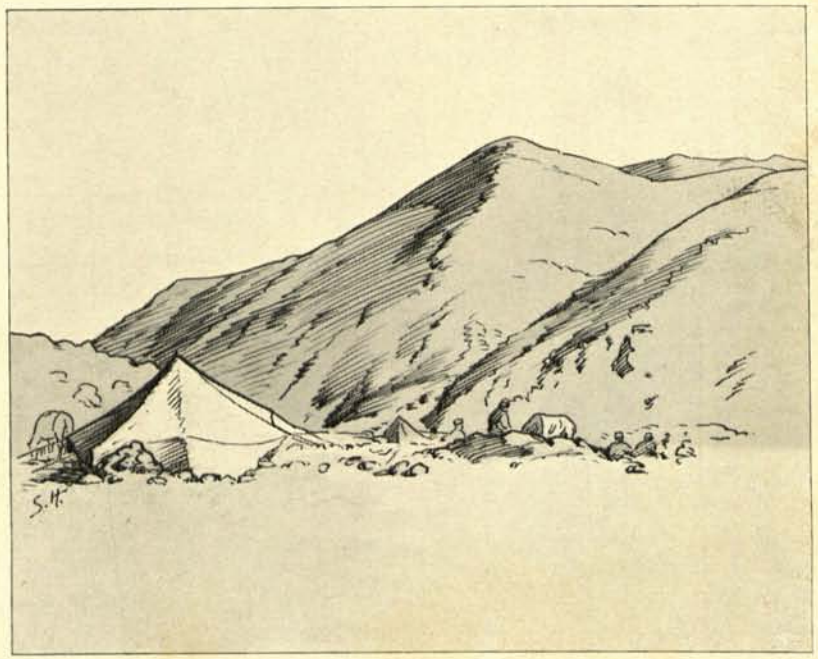
Looking down the valley from Chogelung (April 18).



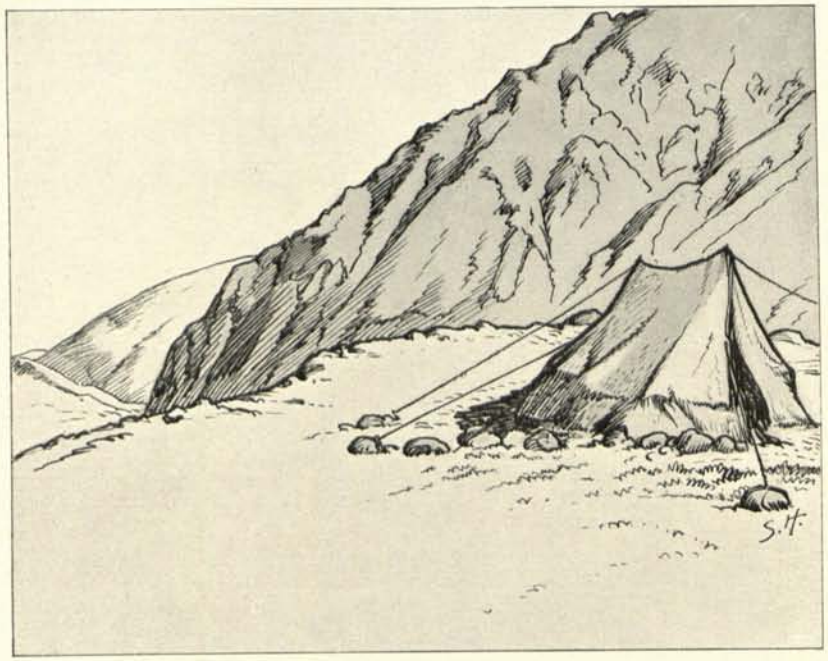
Looking up the valley from Chogelung.



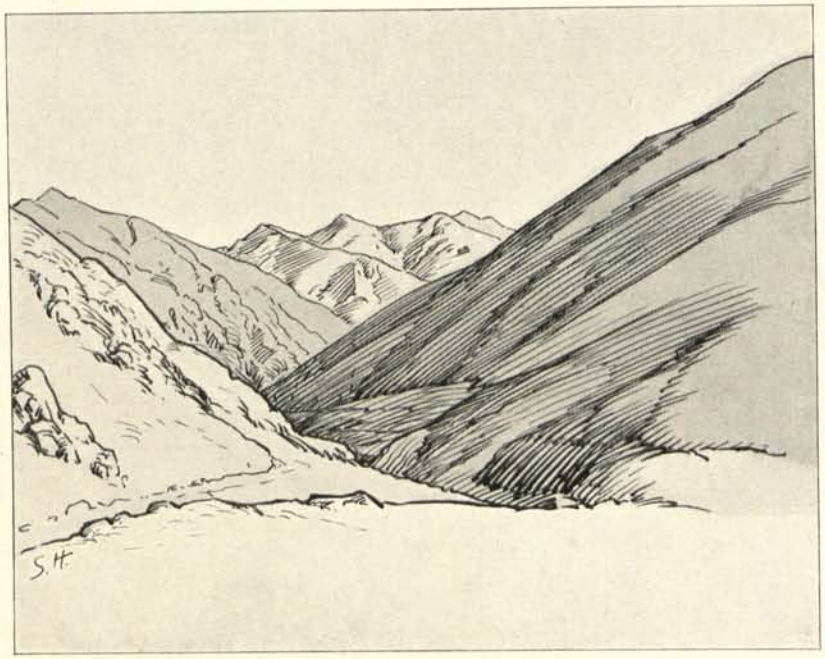
Lungchen (April 20).



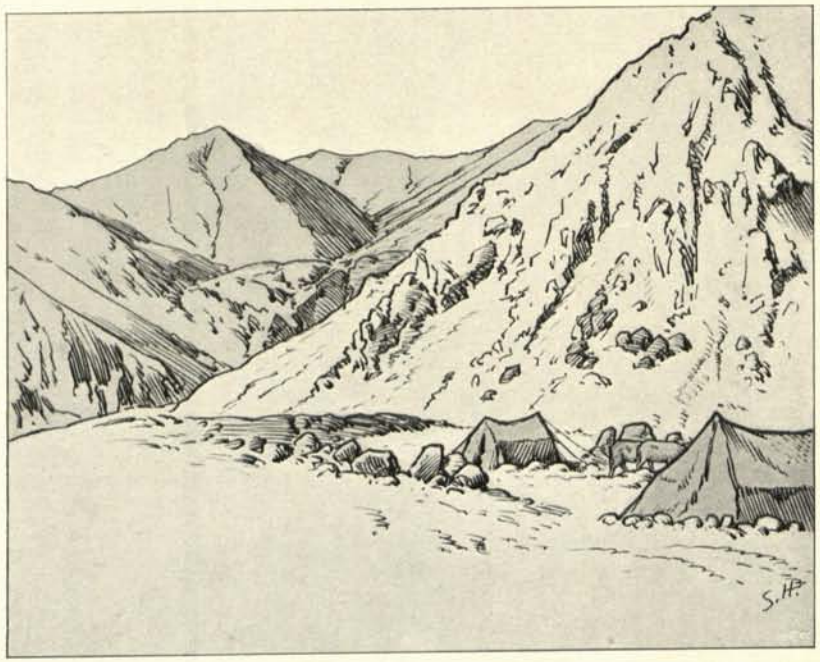
Camp 145, Chomo-sumdo, looking towards the Chang-la-Pod-la.



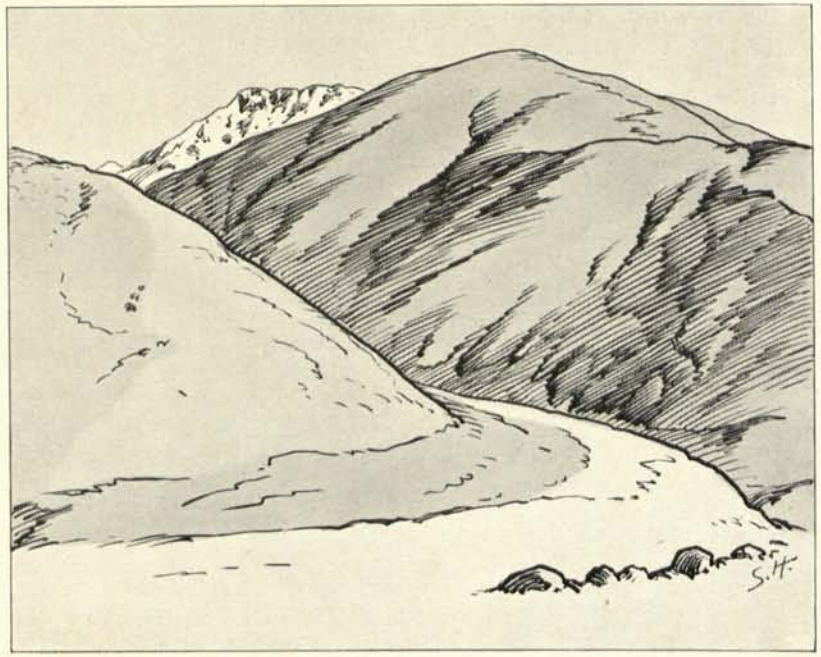
Looking up the valley from Govo.



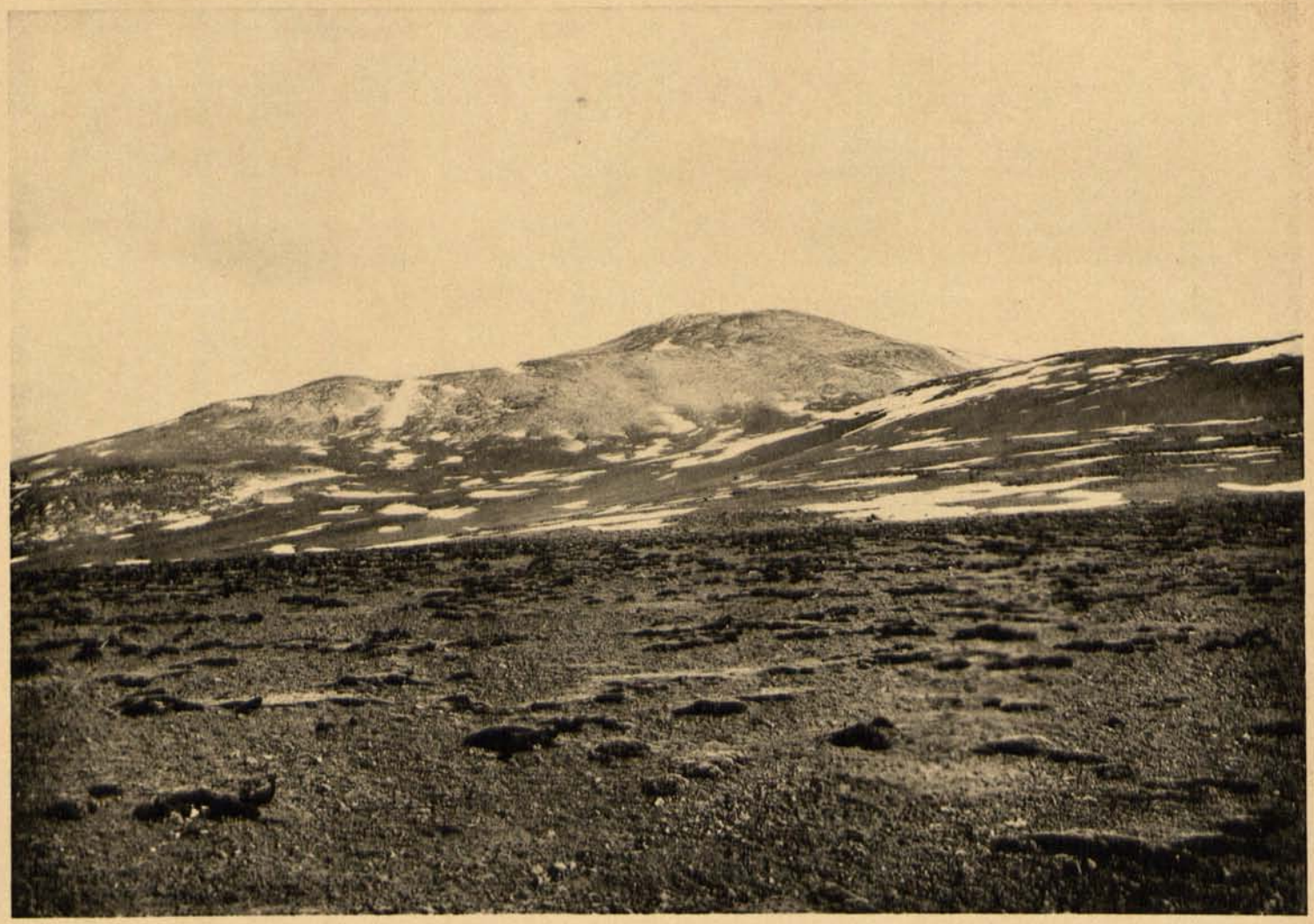
Looking down the valley from Govo.



The Govo valley (April 18).



The valley Portsuk as seen from Govo.



The Chang-la-Pod-la.

The Chang-la-Pod-la pass in the Transhimalaya.

Looking N 50° W from the pass Chang-la-Pod-la.

Tibetan tents on the heights of Transhimalaya.

it is partly on the left, partly on the right side. Generally the river keeps to the left or northern side where the mountains are steep; the southern hills are rounded and afford excellent pasture grounds in summer. At a place called Nira, where the road crosses the river, the rock consists of pegmatite and mica schist. Karcha-samba is a bridge in ruins. Above this place the erosion terraces are in four stories, the highest some fifty metres above the bottom of the valley.

The next section of the road, from Chomo-sumdo to Sha-oktsang, takes us over the Chang-la-Pod-la. We have found the rise up the Mü-chu valley rather gradual, although the ascent becomes somewhat steeper from stage to stage. But only close to the crest of this water-parting range of Pabla does the slope become really steep. The ascent from Chomo-sumdo to Chang-la-Pod-la or half a day's march, is more considerable, 777 m, than the ascent the whole way up from Lingö, to Chomo-sumdo or 725 m, eight days' journey. On the Chang-tang or northern side of the pass we have four days' journey to reach a place where the altitude is about the same as that of Chomo-sumdo, or 4 795 m. This gives an idea of the elevation and flatness of the Chang-tang as compared with the southern side of the system, where the running water has cut down the deep peripheric valleys.

From Chomo-sumdo to the pass the left or northern tributaries are: Yagelung and Kemolung, Shalung, Tori and Kongmo, which comes from a pass not far N.E. of Chang-la-Pod-la and in the same range; Tugelung is the last tributary, quite small and with a flat, black mountain in its background. The right tributaries are: Shubru with the high mountain Kaso in its upper part; near its mouth the solid rock consists of marble. Pelung is a small valley; Tsak is a little larger and comes from rocky mountains to the south.

The main valley up to the pass is full of gravel; the terraces become more irregular and smaller. At a place called Chomo-taka there are hermits' grottos in the very steep rocks of quartzitic mica schist. Near the junction with the Kongmo the living rock consists of quartzitic sandstone. Finally the valley opens out and the relative heights diminish. The pass has a height of 5 572 m., and forms a large slightly rounded plateau. It is also called Chang-la-Pö-la, *Pod* and *Pö* being different pronunciations of the same word, meaning Tibet Proper, or southern Tibet, inhabited by a settled population, in contrast to Chang-tang or the northern plains, where only nomads live. Sometimes the pass is also called Chomo-la. The view is limited; only to the east is a confusion of ridges and flat peaks seen, separated from each other by innumerable small valleys.

On Chang-la-Pod-la we leave the system of Mü-chu. We have found it to consist of a very deep cut main valley with two great tributaries, Bup-chu and Ragatsangpo, several moderate valleys and a great number of small tributaries. Combining the first and second crossings, we get a fuller understanding of the topography of the system, although every detail remains in darkness regarding the country between my first crossing and the valley of Ta-nakpo-chu. The country west of the Mü-

chu line is also unknown. The most important orographical feature is, however, the existence of a high water-parting range, Pabla, giving rise to the sources of the Mü-chu, and the Nien-chen-tang-la which is pierced by the river before its junction with the Raga. The joint river, Dok-chu, is thus situated south of the Nien-chen-tang-la. The Mü-chu affords a very comfortable way over a great part of the Transhimalayan system, but at the same time the deep valley makes it impossible to get a distant view and clear comprehension of the orographical arrangement all round. The fifth crossing, over Samye-la, is of quite a different type, very favourable for orientation, as will be seen later on.

The Pabla range stretches E.N.E.—W.S.W., but that part of the range, in which the Chang-la-Pod-la is situated must be nearly meridional, for the road, the direction of which is dictated by the valleys going down from the pass, runs east and west. The meridional part is, however, very short, for the Sha-la and Angden-la, belonging to the same range, are situated to the W.S.W. from Chang-la-Pod-la.

The pass is full of sharp-edged gravel, and so is also the western slope. The road to the west at once enters a well-defined valley between low rocks of quartzitic porphyrite and porphyry. From the left side enter the small valleys Shalung, Chilung and Sha-oktsang; from the right: Mugbalung, Shag-risivi-lungpa and Shageluma. The main valley itself is here called Shak or Shagenang.

At Sha-oktsang the height is 5 233 m. On the section of the road which takes us to Kyangdam, Camp 147, the fall is hardly 200 m, or to 5 050 m, which is much more gradual than to the east of the pass. From the left or south the following tributaries enter the Shak-chu: Nemolung and Chombolung, Salung-kamba and Ngoring; Kölung which is a steep and short valley; Hleynang; Tsölung; Taynang from a ridge in the south, and with a brook joining the Shak-chu on a great widening of the valley; and finally a broad valley, in the upper part of which a low, snow-covered mountain is visible.

From the right or north the tributaries are: Parlung, which is a considerable valley with light-coloured, rounded mountains in its upper part, belonging to a ridge, the continuation of which is visible in the opening of almost every northern tributary. Through the Parlung another road is said to go to Kyangdam, and through its left tributary, Korchen, a road goes up to the Chang-la-Pod-la. At the junction with the Parlung the whole main valley was still like a lake of ice. Ayang is a small valley, but the above-mentioned ridge is seen through its opening. The little tributary Sogang enters near the great *mani* Lapsen-tari. The ridge of hills to the north appears reddish and without vegetation. Tukchen is a very broad and flat valley with a frozen brook. All these valleys are quite insignificant.

Some distance below Camp 146 the Shak-chu valley has a breadth of about 200 m; at its right side living rock occurs, sandy schist, and lower down lyditic schist. The terraces are very small and rudimentary. The bottom is still full of ice; sometimes, as at Tang-yung-ngori, the road goes on the slope of the hills. Then

Camp 146, N. W. of Chang-la-Pod-la.

Looking S 56° E from Camp 146.

Camp 146, N. W. of Chang-la-Pod-la.

the valley widens and has a 3 m high terrace at its right side; below Tsölung the left side terrace is also developed. The gravel becomes more scarce and the detritus material finer. The river-bed is very winding. The Chang-tang nature becomes more and more pronounced: the mountains are low, flat and rounded and their relative height above the bottom of the valley inconsiderable; no steep, rocky slopes are seen, living rock is rare, everything is rounded, levelled, denudated as always in the plateau-basins without outlet. The valleys are broad, flat and open. The fall of the valley is very gradual and the Shak-chu very winding. The morphology is thus quite another than at the eastern side of the Chang-la-Pod-la, where the deep-cut, accentuated sculpture of the peripheric regions prevails. In this respect the Chang-la-Pod-la plays the same important part as a morphological boundary, as all other passes on the continental water-parting.

The Shak-chu widens out to a plain, where, from the Lapsen-tari, the Targo-gangri first becomes visible to the N. 55° W., offering a brilliant spectacle as rising above the whole rest of the plateau-land, and all over covered with eternal snow. To the south and S.W. we also see a considerable range, the continuation of the Pabla; it is covered with some snow and has several flat summits; a pyramidal top straight S.W. is called Ditse-muri. The country is very open, and the view reaches far away and is not hindered or closed in, as in the deep valleys east of the pass. At Tsale-sekung a round stone-wall serves as protection to salt-caravans. The ground consists of coarse sand. The only vegetation is moss and grass. To the north a little ridge appears, cut through by many small valleys and ravines. At a little hill, Kyangdam, the Shak-chu joins the Sha-chu from the S.W., and thus forms the upper course of the Targo-tsangpo, which, during the following days, is left to the west of our route. Sha-chu comes from Sha-la in the Pabla range, where, therefore, the source of the Targo-tsangpo should be situated. Other informants regarded the Tarok-la as the real source of the river. The Tarok-la is shown as situated S. 50° W. Probably there are several equivalent branches from different passes, forming the Sha-chu. To the east is a mountain, Gonak-kekar, with some snow; to the N.E. is Golep, and N. 25° E. Jom, from which the valley Ponglok descends.

The section of the road from Camp 147, at 5 050 m, to Camp 148, Bumnak, at 4 945 m, keeps very much at one and the same level, although slightly undulating, first falling slowly along the upper course of the Targo-tsangpo, then ascending to a very flat threshold, Chumar-la, 5 108 m, and finally descending through the Bumnak valley.

Several right tributaries from the N.E. enter the Targo-tsangpo: Chita-churkang is the first; it is broad, comes from the E.N.E., and has a stream of open water, whereas the Targo valley is full of ice. The Ponglok-jom valley has a small brook; this is the case with Gapu-nitä, which is fed by springs in the neighbourhood. The Uktsang brook was frozen, but had running water under the ice. Then follow Chimkar-mäntang, Longlung and Lungchen, in the background of which the Jom

mountain is visible. Ling-chu is a broad valley between very low hills; the whole country is flat and undulating, only E.N.E. are the Jom hills again visible.

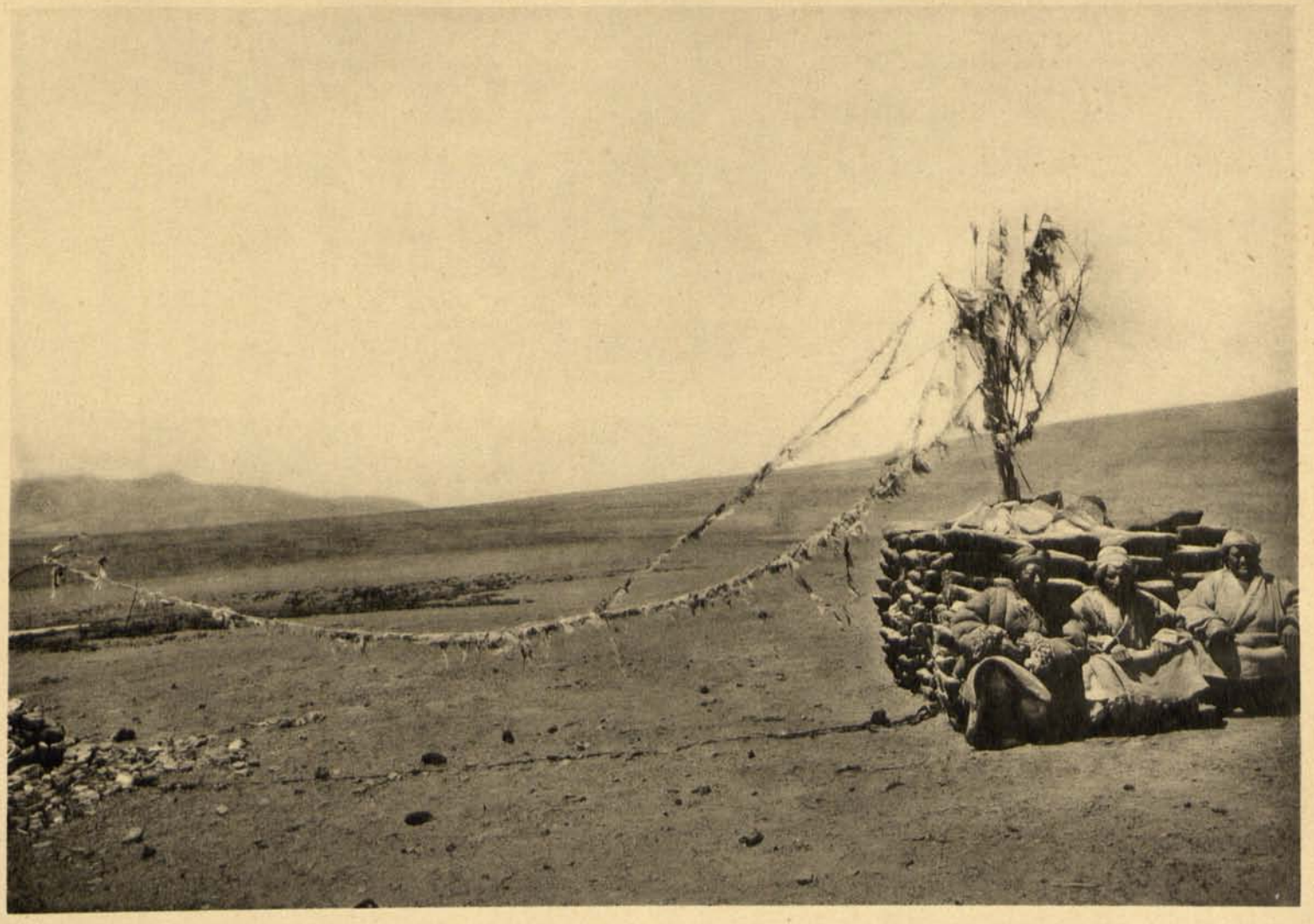
From the left or S.W. side only very small tributaries enter, some of them coming from a comparatively high rocky peak, Chung, not far away to the west. Kipchong is a very small valley full of ice. Kipshung and Shok-chu have well defined valleys, between low hills and coming from mount Chung. Several small valleys are named in common Ling-chu-tible, two of them having special names: Tible-kongma and Tible-ongma, the upper and lower Tible. This is the only part of the upper Targo-tsangpo that is touched by my road; it proves to receive quite a number of tributaries, all of them containing water even at the end of April. The joint river, the greatest of the affluents to Dangra-yum-tso, is therefore well fed, and must in summer be considerable.

Along the shores of the main river the grass grows in "vegetation cones", two feet high; the ground is sandy and there are great numbers of rabbit-holes. The vegetation belt along the river is sharply bounded, and outside of it the ground, consisting of gravel and sand, is nearly barren. There are erosion terraces, but low and rounded. The plain of Kyangdam becomes gradually narrower and is transformed into the well defined valley of Targo-tsangpo. Where Ponglok-jom enters, the breadth of the valley may be $1^1/_2$ km, and its bottom is, to the naked eye, just as level as a floor. In summer the river is said to be very broad and shallow, filling up a good deal of the valley. At Uktsang the right hand terrace is nearly 10 m high. Below this place the bottom of the valley is more like a swamp with many frozen pools and branches from the river. At Lungchen one road leaves the Targo-tsangpo to its left. The valley is here directed to the W.S.W., and soon becomes narrow between black and steep, but low hills; it soon turns to the N.W. The passage is inconvenient for traffic owing to its being full of ice in winter and in summer full of water. The road therefore leaves the valley and takes to the hills N.E. of it.

From Lungchen the following observations were made. To the S.S.W. is a small valley, Tasang; to the S. 48° W. a snowy peak, Gipsung-tao; to the S. 65° W. the peak Chung or Chungmuk, also called Mukbo-chung; to the S. 78° W. we see the accentuated valley of the Targo-tsangpo, with many tributaries entering from both sides; to the W.S.W. is Gablung and to the west Kurtam, both small snowless peaks not far away. To the E.N.E. is the ridge of Jom. Leaving the Targo valley the road slowly ascends very flat undulating slopes with gravel of quartz-porphyry and calcedon and no sign of living rock.

From the Chumar-la is seen, to the S. 59° E., mount Mukbo-kekar, S. 37° E. Chombo, and S. 15° W., again, Mukbo-chung; N. 63° W. is the mountain Bumnak, N. 25° W. Shangbuk, and N. 5° W. Sepsep-la; N. 2° E. is a valley, Lungsang. From Chumar-la the Bumnak-chu descends N.W.; it is a tributary to the Targo-tsangpo and reaches the main river in a roundabout way. On the left

Camp 149.



Lapsen-tari, the place from where the sacred mountain Targo-gangri first comes in sight.

Targo-gangri from a point near Tarbung-la.

The Lapchung-gangri or Shuru mountains as seen to the W. S. W. from a point between Tarbung-la and Targo-tsangpo (Camp 150).

the mountains are comparatively high, to the right mere hills. Leh-sharma is a camping ground in the valley. The Bumnak-chu had now very little water. Near Camp 148 there are some small thresholds of living rock, consisting of quartz-porphyry. Below this camp the Bumnak-chu flows to the north, but soon turns N.W. and receives a tributary from a labyrinth of hills.

Beyond Bumnak the country crossed by our road, which is also the ordinary caravan road to Dangra-yum-tso and Chokchu, becomes more undulating. A fairly steep ascent takes us up to the little threshold Ting-la, 5 105 m, which is a water-parting between the Bumnak and the next tributary. Pelung is a little valley from the right on the eastern side of the pass. From the pass one enjoys a beautiful view of the Targo-gangri, with its several snow-covered peaks to the N.W. and W.N.W. The high-land all round looks like a sea with long, soft waves, where only the Targo-gangri is like a rolling breaker.

On the western side of Ting-la the road follows the little valley of Tasang which receives the tributary Kava from the left. The joint river is a tributary to the main Tasang coming from the south. At its side is seen a mountain group called Yuta with five small peaks without snow, and, as far as can be seen, without living rock. To the W.S.W. and S.W. and at a distance of some 10 or 12 km there is a black range parallel with our road, obviously a water-parting between Targo-tsangpo and some of its right tributaries. To the S. 65° W. is a small peak with some snow.

The road crosses the Tasang-chu which continues northwards and joins the Tingtang-tsangpo, in its lower course called Nagma-tsangpo; the Bumnak-chu certainly belongs to the same system, which joins the Targo-tsangpo from the right. Lachung is a left tributary to the Tasang, along which the road ascends to a new threshold, leaving the little mountain Kurtam to the left. Two small tributaries from the right are called Yera. At Lachung-la porphyrite stands in living rock. Lang-chung-tograng is the next valley from the right or S.W. Camp 149, Kokbo, is at 5 110 m.

The last section of my second crossing continues as before to the N.W.; the fall to Camp. 150, 4 708 m, is 400 m, and one pass, Tarbung-la, at 5 267 m, is crossed. The road first crosses the upper branches of Markor-chu, which flows W.S.W. and is a right tributary to the Targo-tsangpo. Chilung is a now dry bed going to Markor-chu; Hloktsang is a left tributary only seen at a distance. A moderate ascent takes us to Tarbung-la. From this high point the view extends very far to all sides, and is hindered only in a few places by neighbouring hills. One has the impression of being on the very top of the whole country, excepting only Targo-gangri, the highest summit of which is seen to the N. 73° W., whereas its farthest end reaches to N. 35° W.; to the N. 33° W. one sees the depression which indicates the still invisible Dangra-yum-tso. To the S.W. is Shokchung. The mountains S. 20° E. are called Chumuk. Far away to the N.W. is visible the broad

valley of Targo-tsangpo. Beyond the pass the soil is yellow dust and fine gravel with some grass. Targo-gangri dominates the country; it is often altogether or partly hidden, but again its snow-fields appear, covered with clouds.

Kamlung, Chimuk and Rajoa are small valleys from the S.W. The main valley going down from Tarbung-la is dry and shut in by low, rounded hills. Kamsang-shärlung is a valley from the right; the gravel is quartzite, and partly crystalline schist; occasionally the ground is sandy. The main valley opens out slowly towards the junction with the Targo-tsangpo. The hills to the left, or S.W. of the road, have so far hidden the view in that direction, but now the view becomes free over a brilliant landscape, one of the most magnificent in this part of Tibet. To the S.W. and W.S.W. appears a gigantic and dark range with many pyramidal tops, all about the same height and covered with some snow and having a great number of very small glaciers. My guides called it Do and Tang-nupge, probably only local names. To the S.W. is the depression of Shuru-tso, the lake still invisible. To the north opens a broad valley with a road to the pass Shangbuk-la. Through this valley flows the Nagma-tsangpo, joining the Targo-tsangpo at Camp 150; in its upper part it is called Tingtang-tsangpo and Chuma, and amongst its tributaries were mentioned Gojok and Nyunkar; the Bumnak and Tasang we have already mentioned. Nagma-tsangpo comes from mountains to the east, which are a water-parting between Targo-tsangpo and Tagrak-tsangpo, or Dangra-yum-tso and Ngangtse-tso.

The country here is very open and level. East of Targo-gangri the Targo valley appears as level as a floor and on the right it is bounded by moderate sandy hills with grass From the nevées of the Targo-gangri to the east issue, as far as can be seen from the neighbourhood of Camp 150, five glaciers, rather short and steep, and quite white except the very front of the snouts where the blue ice is visible. These glaciers seem to be situated in deep cut furrows; one of them is particularly deep and well protected against the sun, and consequently extends farther down than the rest. Below its snout a very great grey fan slopes down to the Targo valley.

Farther on, two small reddish hills are passed, one on each side of the road. On all slopes to the right or N.E. of the road, five old beach-lines are very well preserved, indicating the former extent and height of Dangra-yum-tso. The Nagma-tsangpo has 3 m high erosion terraces.

At Camp 150 the Targo-tsangpo valley is about 15 km broad; the river is divided into several branches, partly frozen, and very rich in fish. A good deal of bush vegetation thrives between the branches; ducks and wildgeese are numerous in the swamps on both sides. The Targo-gangri rises abruptly from the western side of the valley. On the eastern side are comparatively low hills, one of which, to the N.E., is called Nyemo-mari. Only in summer do the brooks from the Targo-glaciers carry water; at the end of April everything is still frozen. The guides assured us there

Armed Tibetans at the foot of Targo-gangri.

was a road round the Targo-gangri, which only had to cross one pass, Barong-la, said to be situated between the Targo-gangri and the mighty range to the west and S.W. of it.

The right hand terrace of the Targo-tsangpo has a height of $7^1/_2$ m; the terraces of the Nagma-tsangpo are about the same height, but sometimes in several steps; the brook of Nagma had half a cubic metre a second amongst great ice sheets; there are no bushes in its bed.

From a hill, Pumjum, north of and 270 m above Camp 150 one has a beautiful view of the valley of Targo-tsangpo, which becomes broader downwards and finally opens out to the plain at the southern shore of Dangra-yum-tso. The course of the river is not very winding; white ice patches are seen the whole way down and the belts of bush vegetation appear black. The distance to the lake is reckoned to be twice the distance between Camps 149 and 150. As far as can be judged at a distance, the river ends in a delta. In summer the whole bed between the terraces is said to be full of water. At the end of July and beginning of August the river cannot be forded.

At the eastern foot of the Targo-gangri there are two nomadic camps at Gyamtso and Dembung and farther north is Särshik-gompa. The range of Targo-gangri is also called Chang-targo-ri; my guides pretended there were no special names for different peaks and valleys, but probably the nomads and lamas have many local names. Only a double peak at the northern extremity of the range was known as Targo-rigüt. All the brooks from Targo-gangri drain into Dangra-yum-tso, unless some part of the water goes to the twin lakes of Mun-tso; the situation of these lakes, first mentioned by Nain Sing, is, however, still unknown, although they seem to be situated somewhere N.W. of, and quite near, Targo-gangri. To the east the range is sharply defined by the broad valley of the Targo-tsangpo; to the south it is continued by small hills stretching towards the Shuru-tso; to the west the existence of Barong-la indicates a connection with the high western range; to the north the Targo-gangri is said to slope down to a plain which separates it from the lake.

It is an interesting geographical homology that some of the highest mountains of south Tibet are situated quite close to some of the greatest lakes: Targo-gangri at Dangra-yum-tso, Nien-chen-tang-la at Tengri-nor, Kailas and Gurla-mandata at Manasarovar and Rakas-tal. As Manasarovar is, so far as we know, the deepest lake of Tibet, it may be presumed that Dangra-yum-tso and Tengri-nor too are deep. Such lakes as Selling-tso and Ngangtse-tso are very shallow, but no high mountains rise on their shores.

Some parts of the hills on the right side of the Targo-valley have names, such as Pumjum, Ngoyu, Tagrak and Raga-riku, north of which the hills become lower, and finally disappear like undulations in the plain S.E. of the lake. All this has to be explored in the future, as I was not allowed to approach either the lake or the

sacred mountain. The panoramas I have sketched and the photographs I have taken will, however, give an idea of the latter.

As regards the climate during the month of April in the region just described, it will be best understood from my meteorological journal.[1] Characteristic of the southern part of the road are the clear and warm mornings and the heavy clouds without precipitation which set in at noon. At 4 120 m the rivers still have icebands along their banks at protected places. On April 10 the mountains round Ghe were covered with some fresh snow; at the same place the first rain was expected about the middle of June and the Mü-chu was at its greatest in the beginning of August. Near Töngbuk there was, on April 11, some wintersnow still left in protected places at the bottom of the main valley. The higher up, the broader became the ice-bands; the Lenjo, for instance, had a good deal of ice in its mouth. On April 14 there was a heavy snowfall at 4 302 m, although most of such late snow disappears before noon. Above Linga the amount of snow on the higher mountain slopes increases, but is still very scanty. Above Langmar the banks of the Mü-chu were frozen the whole way. At Govo, the regular rainy season is said to begin in the middle or at the end of July, although the rain is seldom heavy and only occasionally continues for two days at a time. Even here the river then becomes so swollen, that it cannot be crossed. At the end of October it is low again. During the winter it remains frozen; in December and January the ice is very thick. In January it snows in the region of Govo; the snow is seldom so much as two feet deep, but sheep and goats are sometimes lost in the snow. Above Leblung the whole river was ice-covered (April 20); such was, of course, also the case with all the tributaries; but water was streaming under the ice in most of them. In this tract the weather was very gloomy, strong S.W. winds, heavy clouds, occasional snow-falls and snow-hail. On both sides of Chang-la-Pod-la everything was hard frozen on April 21. The valleys are full of ice, for the springs continue to run and their water freezes in layers and sheets, soon covering the whole bottom of the valley. When this ice begins to melt in the spring, all the rivers and brooks have a high-water period, after which they slowly decrease until the great high-water period comes with the rainy season. The Chang-la-Pod-la is also a climatic boundary; north of the pass there is always less precipitation than south of it; the weather is as a rule clearer; in April there was less snow and running water to be seen. The winter, February, is more pleasant at Ye, than the late spring in Largäp. The climatic boundary is, however, not sharp; on the Targo-tsangpo the early rains begin at the end of June or the beginning of July and go on for two or three months. The precipitation is very variable from year to year. Some years there is hardly any rain at all; other years it may go on raining for two or several days at a time. The Targo-tsangpo then becomes greatly swollen.

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[1] Compare: Professor Nils Ekholm in Vol. VI.

From a point near Camp 150 in the valley of the Targo-tsangpo. In the background a part of Targo-gangri. To the right, behind the terrace, the river goes down to Dangra-yum-tso.

Animal life is not rich along this road with its traffic. Ducks, geese, pigeons, partridges, eagles, vultures and a good many small birds are seen; the kyangs and Pantholops antelopes appeared only north of the continental water-parting; wild yaks were said never to be seen along this road.

The flora is high-alpine on both sides of the crest; at some places in the Mü-chu valley and along the lower course of the Targo-tsangpo there is some bush-vegetation. Near Govo the junipers are as big as small trees and much more common than lower down. On the Chang-tang plains one hardly sees anything else than scanty grass.

The population as all over Tibet is scanty, but the Mü-chu valley is the best populated of all the Transhimalayan valleys I have seen. The Shang-chu and Ki-chu valleys certainly have a much more numerous population. Several ruins in the lower part of the Mü-chu valley give the impression of a greater population in olden times. The first is seen on the little ridge Chikchung-chang near Chaga, which may have been a fort. Going up the Dok-chu and Mü-chu, the road passes a good many villages, all of them very small and consisting of a few stone huts. Kao is the first, a little west of Chaga. Changra has only 2 or 3 huts and is situated in the mouth of a northern tributary of the Dok-chu. Tangna has 10 huts. Labrang is a house of some religious or administrative importance, and Jo a village, both near Tangna. Samde-dupta is a small monastery in the Dupta valley. Going from south to north we find: Cho-gora, Tashi-gang with only one hut, Mondho, Sanga, Kachen, Sangdo, Machung, Se-nakpo, Saukpa, Gunsa-gompa, a small nunnery, Chamda and Tanglo; *mani* walls and prayer cairns are very common. At Chagri-gapo there are beautiful Buddha sculptures on a granite rock. Then follow Doglo and Lingö. Some of the inhabitants of Lingö go in summer northwards with their flocks 6 or 7 days to Targo-largäp; thus even here the agriculture is insufficient, and the natives semi-nomads. But agriculture is carried on the whole way up to Govo. The next village is Sankar-sumdo; at Chisu some mills are worked in irrigation channels. Kaupeva; Gunda-tamo is a nunnery near the Kabu valley, and Do a village in the Taka valley. At Tong there is a good deal of cultivation; Tong-lova-gensang and Tene are villages of Tong, and Lung-gandän-gompa its monastery. Tong has 25 families, cultivating barley and peas and some wheat; to the district of Tong belong the following villages: Kabu with 7 families, Do with 3, Kanin with 6, Tina with 3, Tso with 15 and Hlalung with 3 families. Dupta is a nunnery, Lingbo a village near Ghe. The village of Ghe has 18 houses and cultivates barley, peas and some wheat. Tangma is the next. All these villages are situated in the mouths of side-valleys, the brooks of which irrigate their fields. Then comes Sanak, and higher up in its valley, Sanak-pu. Chenda is in the Chepu valley, in the upper part of which there are some tents. The village of Shavo or Shao was now uninhabited. At Dera, some cultivation; a party of merchants had pitched their black tents here for a few days. At Kampa in the Dera valley some poplar trees still thrive. Ship, Tinga and

Sam are small villages; Gompa-song a miniature nunnery; Shaï or Gilung-shatse, a village. Then comes Sirchung, above which there are innumerable *manis* and *chortens*. Then follow Nesar, Dungtang, Tsa, Ngangtse, Sangöng and Gyäbra. Dechän-toksar is on the left side of Yamo; then follow Lungmar, Samo-gompa, Kating, where 7 tents were pitched and quite a hundred Tibetans appeared. Then come Rungdo and Tonggyang; Döle-gompa is a small nunnery. The villages Dokang, Gaok and Poo on a right tributary, were not visible from the road. Munkang is a comparatively large village at the mouth of Bup-chu. Then comes Linga-kok below the terrace of Linga-gompa. In the Bup-chu valley the following villages are said to be situated: Damoshar, Dela, Lingya and Ling. Above Linga is Kipuk-nima, and in the Niense valley, Niense and Chugudo. Melung has only one hut, now uninhabited. Then come Donglung and Langmar. Above Linga the *manis* become rarer. Sometimes a single hut without a special name is passed. Geju has two huts. The distances between the villages become greater, and we approach regions where the absolute altitude dictates the conditions of a nomadic life. The village of Ke or Ker is not visible from the road. Govo is the last village on this road. It consists of 7 huts; only barley is cultivated and the harvest is uncertain; the inhabitants, therefore, are more nomads than settled and own great flocks of sheep, goats and yaks.

At Shubra, Leynang and Aynang near Chang-la-Pod-la there were in all 6 tents. As a rule, it was only very seldom that one or two tents were seen along the road to Dangra-yum-tso. But when it was known that my caravan was approaching, the nomads gathered from the neighbouring valleys; thus at Kyangdam 50 or 60 nomads appeared. At Bumnak there were 3 tents and great flocks of yaks and sheep. West of Ting-la 3 tents were seen. At the eastern foot of Targo-gangri two places, Gyamtso and Dembun, were inhabited by nomads.

It is very difficult to obtain any reliable information about the administrative boundaries. The whole way up to Camp 150 seems to be the province of Tsang or, as it is usually called, Labrang, that is to say: under the jurisdiction of Tashilunpo. Kyamdam was said to be the first place in the district of Largäp, which also belongs to Labrang. The frontier between Labrang and Naktsang territory was shown as situated a short distance below Camp 150, and this seems likely, as I had freedom to move about on Labrang territory, but not in Naktsang, which is directly under *Devashung* in Lhasa. Therefore I was not allowed to approach Dangra-yum-tso as being situated in Naktsang. Largäp is, like all Tibetan provinces and districts, subdivided into a number of districts, each under a chief called *Gova*. The Largäp territory stretches some days' journey south-westwards from Kyangdam; the *Bombo* or governor, Jäpa Deva, was said to have his office at Togmo near Ye.

The road from Chaga up through the Dok-chu and Mü-chu valleys is much worn by traffic, and one sees nearly as many passengers and caravans as in the Tsangpo-valley itself, between Ye and Chaga. Especially above and below the Tokcha

bridge the road was much frequented. When the configuration of the valley allows, there are roads on both sides of the river. Near each village many small paths are seen on the slopes and hills, obviously only used by shepherds, hunters and firewood collectors. Where the main road is exposed to the inundations of the high-water, it is sometimes strengthened by help of stone walls. The greater tributaries of the Mü-chu are crossed on reliable bridges. When the natives of Tong go to Tok-jalung and other places of Chang-tang to sell *tsamba*, they always use the high-road over Chang-la-Pod-la. The Mü-chu valley is an important artery of communication between southern and northern Tibet. From Tong no other roads begin, except the ordinary local paths in the neighbouring valleys.

In the valley of Gilung there is a road from Sirchung to Ngartang and Ye-pu, or the mountainous tract above Ye, at Rung-chu. Another road goes up the valley of Tongyang, branching off to Lelung-gompa and to Damoshar; it has to cross three passes. Up the Lenjo valley a road goes to Chang-la-Pod-la. The Gokshung valley has also a road to Lelung, crossing a pass, and a much used road to Damoshar.

A native of Linga gave me some scanty information about the road up through the Bup-chu valley. Damoshar or Tamosha is the last village eastwards, although at Bup, still higher up, a few stone huts exist. To Sham, touched by my first crossing, he reckoned two days' journey; then follows a region called Karake and then Chingdu, which I often heard of on the Sela-la road. Above Chingdu there is a pass called Takte-la, and beyond it is *yakpa*, or pasture grounds for yaks. The Takte-la I had also heard of before, as being situated on the road which is at some distance east of the road between Sela-la and Ye. At any rate we find that there are several roads on the sides of Mü-chu, following its tributaries and crossing passes of which nothing else is known than a few names.

Most of the traffic goes to Linga; above this place the road is not so well looked after, being full of gravel and blocks; here the road goes up and down across terraces, and nothing is done to improve it. A side road goes up the Ke-tsangpo; the summer-road to Tok-jalung keeps to the left side, using the Ke-bridge, as the Govo-tsangpo cannot be forded.

Up the Pashu valley there is a road which, in two days, reaches a place called Tarok and, before reaching it, crosses a pass, Bogbo-la. This pass must be situated in the Pabla range somewhere between Chang-la-Pod-la and Sha-la, for, on its northern side, the road of Tarok is said to continue to Targo-gangri and Tok-jalung. Some nomads on the plateau-land regarded the Tarok-la as the source of the Targo-gangri; perhaps this Tarok-la is identical with the Bogbo-la.

The Kongmo valley has a road said to cross the Pabla range, but only used by nomads. The Parlung valley has a road joining the main road of Chang-la-Pod-la; in the Korchen valley, which is a left tributary to the Parlung, there is another road.

The *manis* become more and more scarce towards the Chang-tang, but they

exist the whole way and resemble a chain connecting the temples and monasteries between Tashi-lunpo and Särshik-gompa.

There is a road from Kyangdam to the N.W. the first part of which is identical with the one I followed over Bumnak and Kokbo. A caravan going in that direction informed me that they would camp the third night on the Targo-tsangpo, probably near my Camp 150; the fourth night on a plain called Luk-ri-buk close by Särshik-gompa; the fifth night on the shore of Dangra-yum-tso, which they called Chang-tso or the northern lake; the sixth night at Tsomgo on the western side of the lake; the seventh night in a valley called Chupgo-momo, and the eighth night at Penla-buk, which is a market-place, and was the destination of the caravan. I could not get any clear information as to the whereabouts of Penla-buk, except that it is a meeting-place for gold diggers and wool merchants, west of Dangra-yum-tso. It seems to be situated south of Kasang-tota, which is the place where the governor of Chokchu has his tents.

Another informant gave the following names on the road from Kyangdam to the lake: Buba, Kokbo, Targo-chundam, on the bank of Targo-tsangpo, Yungkong-särshik at Luk-ri-buk, and Tugo on the lake. The three first mentioned are on my road. Farther on the informant did not know the country, but knew that there was a road from Tugo to Saka-dsong, which first touches Chupgo-marmo and then Penla-buk, which, therefore, must be somewhere west of southern Dangra-yum-tso.

From Kyangdam there is a road $3^1/_2$ days to the pass Sha-la in the Pabla range and beyond; the stations are: Tsangling, Kesär, Sha-la-larsa, at the northern foot of the pass, Tagu-tsavong on the southern side of the pass, Ksham-konak, and finally Amchok-tso: at the river Ksham-chu my third line of crossing comes into contact with this road.

North of Chumar-la is the pass Sepsep-la with a road to Naktsang; it is said to be used by salt- and *tsamba* caravans. North of Tarbung-la is the pass Shang-buk-la, over which a road goes to Ngangtse-tso, three days distant; it is only frequented by thieves and robbers.

Over the range to the west of Shuru-tso there is said to be a pass Toge-la, S.W. of Camp 150, with a road to the province of Bongba. It is very high, full of gravel and stone-blocks, and cannot be used by caravans.

CHAPTER XXXI.

THE THIRD CROSSING.

This line, which starts from Camp 150 on the plain south of Dangra-yum-tso and ends at Camp 168 at the junction of Chaktak-tsangpo and the great Tsangpo, is also a complete crossing of the whole Transhimalayan system. The starting point, on the Targo-tsangpo, is at 4 708 m; the end point, Camp 168, on the Tsangpo is at 4 524 m. As the southern end point of the second crossing is at 4 012 m, where the Dok-chu enters the Tsangpo, this means a fall of more than 500 m of the Tsangpo between the two points, whereas the northern terminals of the two lines are one and the same, Camp 150. The highest point, or the continental water-parting on this line, is Angden-la at 5 643 m. Therefore the rise from Camp 150 to the highest point is 935 m, at a distance of 62,1 km in a straight line, or 71,2 km along my road. From the highest point to Camp 168 the fall is 1 119 m at a distance of 121,2 km in a straight line and 166,7 km along my road.

The season during which this crossing was undertaken was the month of May.

The scree of detritus at the southern foot of Targo-gangri slopes down direct to the left side of the broad and open valley of the Targo-tsangpo; the blocks and gravel of the scree consist of black phyllite, weathered granite, phyllitic quartz-schist, and, most of all, quartz-porphyry. The scree is pierced by several ravines and watercourses from small glaciers. One ravine was 12 m deep, with vertical sides in gravel and shingle beds. Otherwise the road is good and hard in fine packed gravel, and sometimes crosses grazing-grounds. As one proceeds south-westwards, the panorama of the western side of the Targo massive opens up gradually with its snow-covered peaks and its small glaciers between them; the *nevées* are small, and some of the glaciers should rather be regarded as apophyses from a mantle-ice, covering the crest. The southern glaciers seem to extend lower down than the northern. The valley Karmuk carries down a little brook from a glacier front; its left side terrace is double, 3 and 2 m high resp.; the right terrace is single. From the right side the Targo-tsangpo receives here only one small tributary, Gulung.

Näven is a little round depression with a spring and good grass, and surrounded by rolling hills; in their eastern front two lacustrine terraces may be seen; a third terrace which is 7 or 8 m high is fluvial, and bounds the valley of Targo-tsangpo.

On our way to the south appears more and more sharply defined the mighty range with the continental water-parting.

The region round Camp 151 on the left bank of the Targo-tsangpo is called Tsangdam, and the height is here 4 758 m. To the S. 30° W, is a secondary pass, Paklam-la, and beyond it the mountains of Angden-la. The whole range to the south and S.W. was here called Gangri-tau or Gangri-do; it was called simply Do by other informants. A part of it, to the S. 55° W., is called Gangri-masa, and another, to the S. 69° W., is Tsari-nakpo; S. 85° W. is a saddle in the range with a road westwards, gradually turning to the much-heard-of pass, Barong-la or Parung-la, mentioned above; from a distance it seems to be situated in a low mountain-bridge or connection between Targo-gangri and the range west of it; over it a five days' road is said to go to Largäp-chagma, a district probably west or S.W. of the southern corner of Dangra-yum-tso. To the N. 73° W. Punkar is a small peak with snow. A fairly great valley at its eastern side is called Lungring, with its tributary Tarlung; both seem to come from the connecting link between Targo-gangri and the western range.

From Tsangdam the road goes south-westwards, slowly diverging from the Targo-tsangpo after having crossed its two terraces on the left hand, the lower 4, the upper $3^1/_2$ m high. The valley through which the river issues from the mountains is clearly seen, and the bed of its upper part is full of ice; on the second crossing we saw the place where the river enters this little range; here, where it leaves it, the valley is as narrow and impracticable as in its upper part. The connection of Barong-la between the two ranges shows itself more clearly as we proceed, although its morphology remains impossible of discovery. The Targo-gangri sends out six glaciers to the west and S.W., smaller even than those to the east and N.E.

The water-parting between the Targo-tsangpo and the Shuru-tso is curious, for it is a plain, as level as the frozen lake itself, and it is impossible to discover where the culmination is. The height is 4 763 m, or some 40 m above the surface of Shuru-tso. There are no traces of running water, no ravines, no undulations, the whole plain is perfectly level, and the hard ground consists of fine gravel. This plain was once covered with water, and the Dangra-yum-tso and Shuru-tso formed one single lake, which is obvious from the fact that the Dangra-yum-tso is surrounded by 90 m high beach-lines and lacustrine terraces.

Near the shore of Shuru-tso the road suddenly descends a 6 m high terrace; farther on, this terrace becomes higher and has a steep fall to a lower terrace along the shore. The upper terrace is about 30 m high, and cut through by ravines, some with rounded, others with sharp sides. The greatest of them is Sharma, some 60 or 70 m broad near the shore; its right side is almost perpendicular, and shows that it is cut through clay and sand; the bottom is gravel. The next ravine is called Lungchun; just in its prolongation the water was open near the shore; otherwise the

The Lapchung-gangri, one of the ranges of Transhimalaya, as seen from Camp 151.

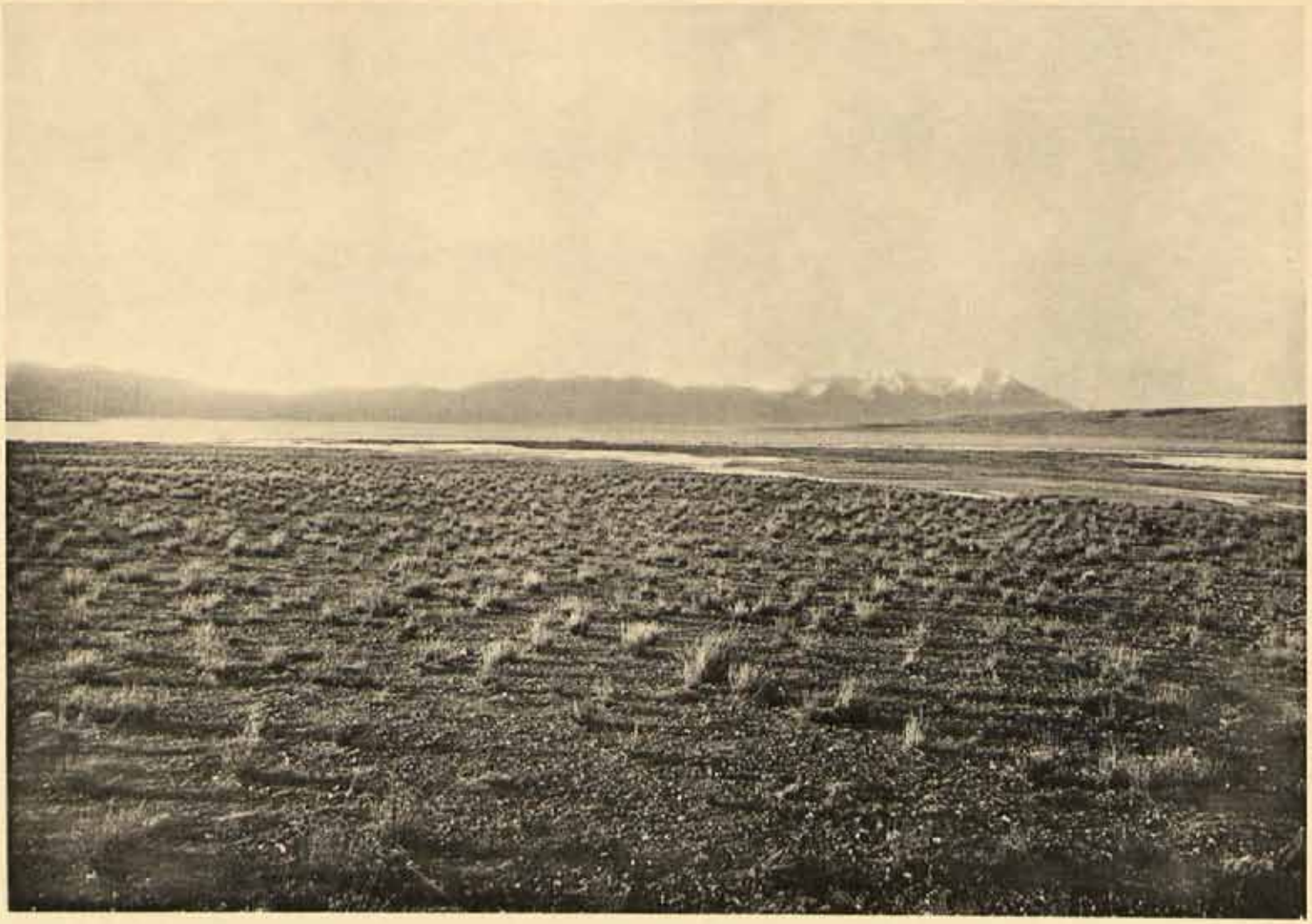
Targo-gangri as seen from a point halfway between Camp 151 and Camp 152, *i. e.* due south.

Targo-gangri and Shuru-tso from Camp 152.

Looking S.W. to the Shuru-tso, from Camp 152.

Camp 152. In the background the Do-tsänkang.

Near Camp 153.



Targo-gangri from Camp 153.

Mount Do-tsàn-kang from Camp 153.

whole lake was still frozen, on May 1. Sometimes there is a narrow strip of level ground along the shore, covered with gravel.

Camp 152 is at the left side of the next great ravine, Parva, on the top of the highest terrace, at 4 753 m, and quite 30 m above the surface of the Shuru-tso. On the road between the two Camps 151 and 152 no living rock is touched; the detritus in the Sharma ravine consists of sandstone, quartz-porphyry and granite. Sari-nakdong and Sumdän are small snowy peaks to the east. To the S. 75° E. are the mountains Parvi-pu, giving rise to the ravine of Parva, the valley of which seems to come from some black mountains situated further east.

Tsalung is the next ravine descending to the lake, some 60 m broad; as usual, the erosion terrace at its right side is steep and sharp-cut, some 7 m high, whereas the left side is rounded; it carries a little brook in a gravelly bed. Towards the southern part of the lake, the terraces retreat from the shore; here it forms not one high terrace but a series of small rounded steps each a few metres high; they mark the slow desiccation of the lake; Tingring is the last ravine from the east. Then the road follows the very edge of Shuru-tso, where the ground first consists of clay and then of soft sand with tussock grass; there are several pools of fresh water containing algæ.

The eastern mountains retreat and the country is fairly open east of the lake. Do-tsänkang is the name of a dominating isolated massive, east of our route. From the south a river enters the southern corner of the Shuru-tso; in its upper part it is called Tagelung-tsangpo, and near Camp 153 Kyangdom-tsangpo. It has a deep bed between sharp erosion terraces, and carried about 1 cub. m among great sheets of ice. Camp 153 is at 4 739 m; the surface of the lake is at about 4 725 m. The southern part of the lake was open.

The situation and form of Shuru-tso is curious and forms an exception from the general rule in this part of the Transhimalaya. Only the Dangra-yum-tso forms a similar exception and both these lakes are situated on an almost meridional line, joined by the broad valley of the lower Targo-tsangpo and the flat plains N.E. of Shuru-tso. In the northern prolongation of Dangra-yum-tso is the lake Tang-yung-tsaka. Thus here we may indeed speak of a broad, open meridional valley, some 150 km or 90 miles long from N.N.E. to S.S.W. Here one can travel a very long distance on perfectly level ground from south to north and *vice versa*, which is otherwise impossible within the boundaries of Transhimalaya. The Targo-gangri is also an exception, being meridional and situated just west of this broad valley.

The two lakes have, as pointed out above, been in connection with each other, just as Ngangtse-tso and Marchar-tso, which, however, stretch east and west. But there is a great difference between Dangra and Shuru. For Dangra is at least 30 or 40 m lower than Shuru, and Dangra is salt, whereas Shuru is fresh. The Dangra is the last recipient; the Shuru has had an effluent at so late a period that

its water has not yet become salt; it is surprising that no sign of an outlet was visible; but there may be an underground one.

Along the southern shore of the lake there is a good deal of algæ where wild geese and ducks are very numerous. From the eastern and southern shore one gets the impression that the mountains at the western shore slope steep down into the lake, but probably there is a flat strip of land between the lake and the foot of the mountains. These western mountains, which I have called the Shuru range, and which have been mentioned above under the name of Do, belong to the highest and most magnificent in this part of Tibet, although there are no particularly high peaks, only a great number of pyramidal summits covered with snow. It will be a beautiful and important object for future exploration to examine this range and its probable connection with the Targo-gangri.

The consistency of the ice did not allow me to measure the depth of Shuru-tso. Only near the shore could some spots be examined. In the southernmost part of the lake the depth was 16 m a short distance N.E. of the mouth of the Tagelung-tsangpo; a series of soundings gave 11, 8, 12, 8, 6, 3 and 2 m, along the edge of the ice which filled the middle of the lake. Probably the lake is deep in the middle. Meridional lakes in Tibet must, as a rule, be deeper than latitudinal; such must be the case especially with those lakes which have high mountains on their shores, such as Shuru-tso and Dangra-yum-tso. The Ngangtse-tso, on the other hand, being latitudinal, has only 10 m as a maximum depth. An indication of considerable depth in the Shuru-tso are also the old beach-lines at a short distance from the present shore of the southern part of the lake. Near the mouth of the Tagelung-tsangpo the highest visible shore-line was 43,5 m above the present level of the lake. As the highest measured shore-line of Dangra-yum-tso is at an absolute height of 4 798 m, there must be higher beach-lines round the Shuru-tso above that of 43,5, which, however, was the highest one visible at the southern end of the lake.

The sources of the Tagelung-tsangpo are said to be situated at two days' journey S. 40° E. in the high range of Angden-la and Sha-la. Quite close to its mouth, another river, Tsargam-tsangpo, coming from the S.S.W., enters the lake. Where it enters the lake the flat shore plain is comparatively broad, but becomes narrower to the N.W., and at some places the slopes seem to reach the very edge of the water.

Instead of following the course of the Tsargam river, the road turns S.W. amongst hills which are the last undulations of the high western mountains. Several affluents to the Tsargam descend from them. One of them, Otsuk, has cut a deep valley at the S.W. foot of the little threshold Dunka-la. The next tributary is Amlung, in the background of which are seen snow- and ice-mountains. Then follow Gabrup, Serchung and Serchen, separated from each other by lower, rocky ridges. All these tributaries go through a deep cut valley to Tsargam-tsangpo. At this season they had very little or no water. The Tsargam and Tagelung, coming from very high mountains, bring a good deal of water down to Shuru-tso.

A last view of Targo-gangri — from Angden-la.

Near the little valley Page-lungpa there is a living rock of quartz-porphyrite, — elsewhere living rock is very rare. The ground is soft material, fine gravel and dust, here and there covered with moss. In the beds of water-courses the ground is treacherous, sinking under the feet of the animals. Tanglang-chu joins the valley of Serchen and several other tributaries, and goes down to Tsargam. At one of the tributaries Camp 154, Sabuk, has a height of 4 947 m. The snowy mountains to the west from which the Serchen comes, are called Rong-serchen-kang.

The valleys of Sabuk and Tsechung join the Tsargam-tsangpo; both are full of ice at this season. The road follows the hills between them and crosses the pass Bäng-la, 5 237 m high. The rock in the neighbourhood is quartz-porphyry. Although Bäng-la is secondary and without any importance, it affords a magnificent view to the north, especially over the mighty Targo-gangri, its glaciers and snowy summits; to the right of it is seen the deep, broad valley of the Targo-tsangpo; the Dangra-yum-tso is hidden, but the mountains on its eastern shore appear in rose colour descending to the lake; Shuru-tso is hidden by hills; to the N.N.W a snow-covered mountain is called Gablung-pu. In the mountains to the west are the deep valleys of Tanglang and Changchung. Southwards the ground rises to the heights of Angden-la.

South of the Bäng-la we enter a round arena-valley, surrounded by relatively low, partly snow-covered ridges, sending several brooks down to the Sabuk. Camp 155, Angjum, is at a height of 5 186 m. From here the slope becomes steeper; the hills are pierced by many deep ravines; from the west comes the valley Lung-chang, with high snowy mountains in the background. The ground is very soft and swampy, with grass and moss, everything hard frozen; gravel is rare; in protected places the snow lies two feet deep. The last bit is a stiff climb in the bed of the brook which comes from the pass.

Angden-la has a height of 5 643 m, and is marked by a *mani* cairn with flags. The living rock on the northern side of this flat pass is quartz-porphyrite, quartz-conglomerate, and some greatly weathered schistous rock. The pass is situated on the continental water-parting, and in the same range as Sha-la, Chang-la-Pod-la and Sela-la; to the west this range seems to be connected with the Kanchung-gangri; northwards the water runs to Shuru-tso, southwards to the Raga-tsangpo.

The view from Angden-la is fascinating, though much is hidden by the sporadic snow-mountains, rising especially in the west and east, above this hopeless confusion of ridges, ranges and ramifications. To the south the northern range of the Himalaya is clearly seen with its innumerable flat, snow-covered peaks, all apparently of about one and the same height, and north of the gigantic range is the great valley of the Tsangpo. To the north the whole Shuru-tso is visible, whereas the Dangra is hidden behind the Targo-gangri which dominates the whole northern horizon. To the N. 61° E. we recognise the peak Do-tsänkang.

A second threshold close by is only some 10 m lower than the principal one.

The living rock consists of quartz-porphyrite and conglomerate. Between the two passes a brook Sanglung descends S.E. to the Kyam-chu. From the second threshold the road follows a little brook called Angden-tur containing some water, although there is much less snow on the southern side of the pass than on the northern. From the N.W. enters the Angden-pu. At Yiblung, from the left, phyllitic schist stands in living rock. Shalma is the next valley. The bottoms of the valleys are more or less filled with ice from springs and swamps. The main valley, with the road, is very regular between its steep mountain sides and its breadth of about 100 m. Near Angden-do quartz-hornblende porphyry stands in living rock.

Finally, our valley joins the great valley of Kyam-chu coming down from Sha-la; it is some 10 km broad and has interrupted snow-mountains at its left side. All the mountains around are of moderate height and only the northern slopes are snow-covered. Only the double peak Yamjo-gangri to the S. 52° W. seems to have eternal snow. From the junction of the Angden and Kyam it is said to be two days' journey to Sha-la, the great distance depending upon the fact that the Pabla range stretches to the E.N.E. and probably for some distance is nearly parallel to the upper course of the Kyam-chu. The Sha-la seems to be half-way between Chang-la-Pod-la and Angden-la. At the junction, the river, also called Kyam-chu-tsangpo, has, on the right hand a terrace 5 m high and carries about $1^1/_2$ cub. m a second. During the summer it is a large stream and in the rainy season it sometimes cannot be crossed. At the right side there is a double valley called Gabelung; Lungdung is a valley to the left. At Camp 156, Kyam, the height is 4 954 m. Ngangtsang is a left-hand promontory near the camp.

N. 82° W. from Kyam a considerable valley enters the Kyam-chu from the right side; its name is Umsog; through it a road, only used by hunters, is said to go to a difficult pass, beyond which the region is called Raga-takya, indicating that the pass is secondary and situated somewhere north of the upper reaches of the Raga-tsangpo. The country round Kyam is comparatively open. To the N. 25° E. is a high dark mountain giving rise to the valley Chagelung; N. 33° E. is Sanglung, a valley beyond which moderate, reddish mountains appear. To the N. 69° E. an isolated peak is visible, said to be situated just east of Sha-la. Tambe and Kintang are small snow-covered mountains to the east and E.S.E. Panglung is a peak visible to the S.S.W.

The valley opens out to a real plain with hard ground, a little gravel and some scarce grass; it slopes very gradually southwards to the Amchok-tso, and is called Amchok-tang; the river, which was frozen above Ngangtsang, was now open; the mountains to the west are rather low and here and there covered with snow which disappears during the early part of the summer; farther west, higher snow-mountains are visible through the opening of the valley Gaptra; they must belong to the Kanchung-gangri. Panglung-sumba is a depression west of the road, with springs. Pema-shenta is a double valley from the west, and Tsira another at the same side, where Ngingri is a conical top.

The broad, open valley of Amchok-yung.

A tent on the plain Amchok-yung.

The mountains bounding the Amchok-tang to the east form a meridional range, which should, perhaps, be regarded as a southern ramification from the Pabla. On it the following mountains are observed: Togok, Shamda, and Chen-yangri, the last situated east of Amchok-tso; Okchung and Okchen are two valleys from the east. The bed of the Kyam-chu, which is broad and shallow but sharply defined between its grass-covered banks, follows the foot of the western mountains. The western, or right, tributaries, Ngingri-changma and Ngingri-hloän, contain small brooks; near the latter the rocks consist of mica-porphyrite.

Camp 157, Hramsang, is at a height of 4 870 m and near the N.W. corner of the Amchok-tso. Although this lake is situated south of the water-parting, it is some 150 m higher than the Shuru-tso, which belongs to the Chang-tang. In spite of this, the Amchok-tso was, on May 8, perfectly open, only a few blocks of ice being seen at the northern shore, this depending on the very hard and incessant S.S.W. wind which had been blowing during the last few days.

The Kyam-chu goes out into the Amchok-tso at its northern shore, where it forms a wide-spread delta full of clay and sand. Farther east, a series of sand hills a few m high and with grass at the top, fall steeply down to the flat sandy shore. At the N.E. corner of the lake issues the effluent, Dongmo-chu. It receives a left tributary, Rong-serchang, and flows between high, snow-covered mountains which, as I have pointed out before, probably belong to the western end, or in fact *are* the western end of the Nien-chen-tang-la. Finally the joint river flows into the Raga-tsangpo. It leaves the lake from an inlet and is broad and shallow to begin with, but soon becomes narrow. In May it contains very little water. The natives asserted that the level of the lake stands much higher in summer, as could, too, be seen round the shore. During the rainy season the Kyam-chu brings heaps of clay and sand with it, and the northern part of the lake is therefore very shallow, being only half a metre deep even 100 m from the shore. When waves are raised by hard wind, as during my visit, the whole lake is grey with mud; the water had a temperature of 6.6° at noon; it is of course perfectly fresh and contains algæ. The greatest depth I measured was only 3.66 m, so the Amchok-tso is extremely shallow. As a continuation of the lake to the north may be regarded the great plain of Amchok-tang; to the west, south and east the lake is surrounded by hills. At some places, as at the N.W. corner, grey, fine-grained granite crops out.

From Amchok-tso the road does not follow the Dongmo-chu down to Raga-tsangpo, but turns west and S.W. to cross the range, at the northern foot of which the little lake is situated. The valley, followed by the road, is of a curious form; it is not broad, but along the middle is a ridge of gravel and shingle, separating the Serma-chu at the right side of the valley from the Pu-chu at the left. The Pu-chu comes from the mountains to the N.W. and W.N.W., beyond which is seen a snowy peak, Yarnjo, not very high. Serma-chu comes from the south. The two brooks do not join on their way to the lake. The Charung coming from the left

side joins the Pu-chu, and Bug-nakta coming from the right, joins the Serma-chu. The former comes from a black mountain, Ürok; the mountains opposite it are called Sokba; Sokchung-le is a place in the valley below them; Pendo and Okbö-kaktsang are small valleys from the right. The country is open and flat, the surrounding mountains relatively low; only to the S.W. are there comparatively high snow-covered mountains, from which descend two valleys: Tsa-tunglung and Nakdong, the latter from a peak called Gurkar. Tabuk is a small valley from the same direction. All these valleys originate from one and the same mountain-group covered with snow, although not eternal. Camp 158 at Serme-lartsa is at 5 310 m.

On the eastern side of Serma-chu is a low ridge, which the road crosses in Serma-la, and then goes down to another valley, Serma-leting, which probably reaches the lake south of Serma-chu. A mountain ridge on the right side of Serma-leting is called Tengri-gok. Leting-tavuk is a tributary from the left or west; a valley from the east is called Chakta. The detritus consists of red porphyry. The ground rises slowly up to the pass Sao-lungring or Lungring-lachen, 5 387 m high, which is secondary, as the water from both sides goes down to Raga-tsangpo. South of it is the valley of Lungring, which comes from comparatively high snow mountains in the N.W. Here the detritus is grey granite, the living rock conglomerate and dark limestone. The Lungring is a direct tributary to the Raga-tsangpo; to the east it is bounded by a well-defined ramification, in which there is a curious depression or saddle, so deep as to permit a view over to the eastern neighbouring valley and to the ramifications east of the same.

Talung is a right tributary to the Lungring. The road crosses it near its junction and then goes over a ridge to another valley, Tajep. All these small valleys are tributaries to the Raga-tsangpo. The Tajep is broad and open near the road, but then goes through a narrow passage between steep mountains to the Raga. The road then goes up its right tributary, Puga, to a small threshold, 5 384 m high. After another little valley and threshold we reach the valley Tsarok, where the living rock is dark limestone. A little below a widening called Tsarok-pagla, the Tsarok valley joins the Raga-tsangpo at a height of 4 861 m, showing a fall of 848 m on a distance of 180 km down to the junction with the Tsangpo.

The Shuru-tso is at 4 725 m; the Raga-tsangpo, Camp 159, at 4 861 m. Between both are two great ranges, the northern, Pabla, with the continental water-parting and crossed in Angden-la, 5 643 m high; the southern, the probable western continuation of the Nien-chen-tang-la, in Sao-lungring at 5 387 m. From the water-parting there is a fall of 918 m to the Shuru-tso on a line of 31,5 km as the crow flies; to the Raga a fall of 782 m in 48 km. Amchok-tso is at 4 860 m. These values will give an idea of the general flatness of the system, and also of the existence of two very well defined mountain ranges between the Shuru-tso and Raga-tsangpo. There may, perhaps, exist some smaller ranges between the two principal ones.

Camp 157.

My road then follows the Raga-tsangpo for two days. The valley rises slowly to the W.S.W. At first it is rather narrow, but soon becomes half a kilometre broad, and halfway it opens out to a breadth of 3 to 5 km, and is more like a plain. The ground is hard and even, partly covered with gravel, partly with low close grass, which sometimes forms a real steppe. As a rule, the river keeps to the right or southern side of the valley; it is open the whole way; only in the more protected and shadowy side valleys is there still ice. At Camp 160, the Raga-tsangpo carried $5^1/_2$ cub. m a second; the current is quick, but seldom forms rapids in this part of its course.

On the left or northern side of the valley the mountains are higher than on the right. They are wild, steep, rugged and rocky, pierced by short, narrow valleys, and here and there covered with patches of snow, but between the valley and them there is a confusion of low, yellow, rounded hills, for some 10 km. The southern mountains are, as far as can be seen from our road, of respectable, but no great height, and nowhere covered with snow. The river sweeps along their foot and does not leave room for any marked erosion terrace, as on the left or northern bank. In the openings of the side valleys, however, one sees some more noticeable massives, one of which is called Marpo, another Rinak, or, according to other informants, Ngangba-kanja. Through the Ngangba valley one sees 10 or 12 km south a short ridge, stretching east and west.

From east to west we notice several tributary valleys; from the north: Kyak-chung, Töchung, Racho, Tökya; beyond a small isolated rock is Tibuk; the rock is here grey sandstone, forming small thresholds hardly rising above the ground; to the west a hill gives a beautiful view over the whole valley with the great mountain group of Chomo-uchong in the background; Shalung is a small valley with 15 m high erosion terraces; Pendem is larger; both these join the Teeng-chu before entering the Raga-tsangpo; Salung is a small valley issuing from between low hills; Parva is the next, quite full of ice in its mouth; finally Yalung and Lungchung. From the right side, i. e., from the southern mountain range which is situated between Raga-tsangpo and Tsangpo, we have Tipkuk; Shärlung and Sukshin, which join before leaving the mountains; Damlung, Naga and Ngangba, the latter comparatively large, whereas the Tograng is short and steep. Of course, none of these valleys can come from any far distance, as there is no space between the two great rivers. But even the northern tributaries are very short and, as far as can be seen, none of them has been able to pierce the range which I take to be the western prolongation of the Nien-chen-tang-la. The Dongmo-chu from Amchok-tso is the single one which pierces the range. We have seen that the Mü-chu-tsangpo also pierces it further east. But whether there is any other tributary, between Dongmo and Mü-chu which breaks through the range cannot be ascertained from what we know at present. A party from Ryder's and Rawling's expedition followed the Raga-tsangpo

upwards, but they have nothing to tell about the northern tributaries, as they had no opportunity of making excursions to the north.

Camp 160, Yo'on, is at 4 919 m, showing a very moderate rise of the road from Camp 159 with its 4 861 m. Camp 161, Raga-tasam, is at 4 948 m, but the distance much shorter. To Camp 160 the road keeps to the left side of the river; to Camp 161 to the right side; here the valley is narrower and the road sometimes follows the slope above the river; one such place is called Oktsang-tang. The rock is grey sandstone. The Raga-tsangpo is formed by two rivers which join at Kamba-sumdo; the northern arm which comes from W. and W.N.W. is called Changshung, the southern, which is followed by the road, comes from S.W. and is called Hloshung. As could be expected from the whole orographical situation, the Changshung is the greater of the two; it seems to gather its tributaries from the southern slopes of the Kanchung-gangri.

The Hloshung is full of blocks, between which the ice is sometimes two feet thick. From the right enter the tributaries Talung, Rachik and Lunglung; from the left Nublung. The valley becomes broader and more like a plain, where the considerable valleys Lamra, Shosar and Pangreng enter; Lamra comes from mount Ngangba-kanja, which, from this side, looks like a black, conical peak. From the left or N.W. comes a small tributary, Ni-taro; from the right, S.E., Novuk and Ta-tsang. At the same side there is a miniature lake or rather pool, Tso-gelong, from which a brook goes down to the river.

At Raga-tasam our road joins the *tasam* or highroad between Lhasa and Ladak. At this place the following names of the surrounding places were given: to the S.W. the valley Yumbo, joining the principal valley Yumshung, stretching westwards; to the S. 65° W. a mountain called Gal; the highest peak of Chomo-uchong rises to the N. 83° W.: to the W.N.W. there is a temporary lake or swamp only filled during the rainy season, and called Sham-tso; N. 25° W. is a black, partly snow-covered mountain, Lombo, at the northern side of which a twin-lake is reported to exist, called Takya-Man-tso-Pun-tso; one of these lakes is said to be greater than Amchok-tso, the other smaller. I could not get any other information about this somewhat mysterious lake. If it exists at all, it must belong to the same kind as Amchok-tso and be situated at the northern foot of the western prolongation of the Nien-chen-tang-la. The distance to the twin-lakes is said to be one long day's march. Lakes are rather rare on the southern side of Transhimalaya, and those existing always contain fresh water. On the way to Lombo a small pass Tungsi or Tungsi-gunka has to be crossed.

From Raga-tasam to the N. 20° W. a road passes the La-pendang to Nyaga and Targo-largäp, of which I could get no reliable information; the La-pendang is probably not on the continental water-parting, for it is only two days' journey from Raga-tasam; it is, however, said to be a rather high pass. To the N. 79° E. is Ngangba-la a low threshold crossed by the *tasam;* N. 83° E. Ngangba-kanja is

visible and beyond it is Kedo-tasam, one of the stations of the high-road; S. 80° E. is Sangba-la, and E.S.E. a snow-covered range Tagse-tao, the principal range between and parallel to the Raga-tsangpo and the great Tsangpo; one of its peaks has some religious importance like the Chomo-uchong. Luser is a flat, black mountain S. 74° E.; Sanglung-chechung is S.S.E. of, and quite near, Raga-tasam; straight south, a monastery, Chetu-gompa, with 15 Lamas, is said to exist.

The rise from Raga-tasam to the W.N.W. is as gradual as before, and Camp 162 is at 5 006 m. The valley, Yumshung, is here very broad and open, and its river is still called Raga-hloshung, or the southern main branch of the Raga-tsangpo. The ground, fine gravel and grass, is hard and comfortable; to the north the valley is bounded by low, rounded hills, beyond which is seen a high, black, rocky range with rugged crags. The river, Raga-hloshung, has not even half a cubic metre of water; it winds very much in its broad, shallow bed. It is joined by the two southern valleys Yumbo and Yumbo-gablung, which at their mouths give rise to swamps. Swamps are ordinary in the main valley and force the *tasam* to keep to the foot of the southern mountains, whereas my route follows the northern foot. On the northern bank of the Raga-hloshung the road goes over a ridge of small hills, where grey sandstone crops out. From the southern mountains comes Goche, from the northern Tagelung and Iri-sang, which, higher up, is in connection with the Tungsi-gunka. Iri-sang is a comparatively big valley coming down from the black range to the north, to which Lombo belongs. It is not at all surprising that the members of Ryder's and Rawling's expedition could not make out the orography north of this route, for a few profile lines across the whole system are not sufficient to follow and determine the extent and situation of the several ranges. It seems, however, probable that a range is situated between the northern and southern branch of the Raga-tsangpo, and that this range is the continuation of the one we crossed in Lungring-la. For it is not likely that Lombo should be connected with Lunpo-gangri, situated further west even if Lombo and Lunpo are only different pronunciations of one and the same word. The Tibetans very seldom give general names for whole ranges, and only use local names for parts of ranges. At any rate I regard it as pretty certain that a range extends south of the eastern part of Kanchung-gangri.

The mountains south of the Yumshung valley are not high; Tarchung, Tarchok-parva and Tarchok-tangbo are valleys from them. Talung, Nalung-dukchen and Nya-pangva are valleys from the north. To the S.W. the *tasam* rises to a threshold called Kule-la or Kur-la.

From Camp 162, Chosang-jung, the following mountains and valleys are observed: to the north a part of the black and rugged range of Lombo; to the N.E. low hills hiding everything behind; E.S.E. the snowy mountain between Raga and Raga-tsangpo; S. 22° E. a massive at the upper part of the valley Tarchung-pu; S. 20° E. a small isolated hill, Tosop-tevo, rising from the plain close by, and bey-

ond it Tarchok-parva; to the south two isolated hills, the nearest Tibo-tevo, the farthest Tasam-tevo, obviously passed by the high road; S.S.W. is Tarchok-tangbo; S. 41° W. an isolated hill, Chosang-tevo; to the right of it two valleys descend from the S.W., Chikelungi-teblung and Chikelung; to the N.W. is a mountainous region called Kichen-talung-changri, and N. 54° W. Semo-tandung. Amongst these mountains the Raga-tsangpo is formed by many tributaries.

Farther westwards the rise is very slow, over yellow earth with some grass and moss, but finally the plain forms into a determined valley receiving some now dry ravines from the partly snow-covered hills to the S.W. On the little pass, Ravak-la, 5 227 m high, calcitic schist stands in living rock. From this pass which only separates two branches of the upper Raga-tsangpo from each other, the following names are pointed out: W.N.W. a region Kichung-sutuk; N. 48° W. the above-mentioned dark massive, Kichen-talung-changri, and, east of it, the valley of Raga-changshung with the northern source-branch of the Raga-tsangpo, which joins the Raga-hloshung a little above Camp 160. The two branches are separated from each other by rounded ridges of no great height, and, as far as can be made out, the Raga-changshung flows south of the black rugged range which is the western prolongation of the Nien-chen-tang-la, which we crossed in Sao-lungring-la, S.W. of Amchok-tso. To the S.W. is the pass Kichung-la, from which a brook runs down to Camp 163, 5 198 m high and called Kichung-sumno; to the N.E. are visible some parts of the Lombo range, which has its highest part to N. 39° E.; Tsopti is another part of it a little farther east, while still farther east the same range is called Raga-tangbo-pu, with several rather sharp snowy peaks and sending down to the Raga-tsangpo the northern tributaries we know from between Camps 160 and 159. To the N. 85° E. the valley of the Raga-tsangpo presents itself as a broad and well defined depression between these mountains; those to the south of the river are said to be called Taktse-jadang, and their culmination is seen to the S. 80° E. The mountainous region south of Ravak-la is called Ravak-Chi-kelung, from which two of the tributaries mentioned descend to Raga-hloshung.

From Camp 163 the Kichung-sumo is seen running N.N.E.; its valley is rather deep, and, in its prolongation, the Lombo range lifts some of its black pyramidal peaks. This region is one of the most complicated in Southern Tibet. It is easy to lay down and control everything in the immediate neighbourhood of the route, but as to the orography and hydrography at some distance one has a feeling of uncertainty. This is especially the case with the Lombo range. Only so much could be made out from the route between Camps 163 and 164 that the northern branch of Raga-tsangpo chiefly comes from the southern slopes of Lombo, and the southern branch of Raga-tsangpo chiefly from the northern slopes of Chomo-uchong.

The road goes steep up the Kichung valley to S.W. The slopes are mostly covered by detritus, dust and fine gravel of calcitic schist, here and there some grass and moss appear; there was (May 23rd) still a good deal of snow, and the ground

was always moist and swampy. The barren slopes show clearly by concentric lines, that the whole mass of fine detritus moves slowly downwards, a phenomenon that is very common in the highest regions of Chang-tang; such regions are very treacherous both for men and animals.

Three small valleys contain the highest feeders of the Kichung: Kichung-tiblung-ogma, Kichung-tiblung-barma and Kichung-tiblung-toma, all three with brooks from melting snow. The Kichung-la has a height of 5 504 m and a rather narrow crest; there is no sign of vegetation, everything is detritus, and living rock is found only in a little threshold, tight, hard schist. The pass is a water-parting between the Raga-hloshung and the Chung-sang, which goes its own way down to the Tsangpo. Innumerable small brooks join to form the Chungsang, which first goes S. 25° W. but then turns south; Chomo-toye is a little rocky tooth at its left side; at a place called Penlung a few miles down in this valley, a tent was pitched. Lower down, Hopkän is a valley from the Chomo-uchong, surrounded by hills with good pasture grounds. Still farther down, a series of ridges and ramifications are visible, and beyond them the deep gigantic valley of the Tsangpo. Far south a high snowy peak, Ngari-tsunga, is said to be on the frontier of Nepal; the rest of the Himalaya was hidden by clouds. On Ryder's map there is a valley which very well corresponds to my Chungsang valley.

To the W.S.W. the magnificent peaks of Chomo-uchong are beautifully visible with their snow- and ice-fields. To the N. 83° E. is visible the well-defined but flat depression in this hopeless labyrinth of ranges, ridges and inumerable ramifications, which is formed by the joint Raga-tsangpo.

In order to reach a second pass, 5 480 m, close by, one has to follow the very crest, from which the source-branches go to Chungsang; its slopes are steep and living rock of quartzitic breccia, crystalline limestone and basalt, crops out at some places. This nameless threshold is a water-parting between the Chungsang to the south, and to the north the Kichen-kada, which turns N.E., E. and S.E., and joins the Raga-hloshung.

A third threshold is also nameless and divides the water only between the uppermost feeders of the Kichen-kada. The fourth pass is Kanglung-la, the highest of all, 5 528 m. being a water-parting between the Raga-tsangpo and the Chaktak-tsangpo. This mighty mountain-knot to the N.E. of Chomo-uchong thus distributes the water to three of the northern tributaries to the Tsangpo: Chaktak-tsangpo, Chungsang and Raga-tsangpo. On Kanglung-la, sandstone stands in living rock. The view from this high pass was very hidden, partly by surrounding mountains, partly by clouds and falling snow. To the N.E., however, some parts of the Lombo range are to be seen, but beyond them no high snowy mountains; the Lombo range hides everything in that direction. From the pass, the valley Kanglung-shärki-pu, a tributary to the Chaktak-tsangpo goes down to the W.N.W. The left slopes of this valley are full of snow and are cut through by many watercourses. The

right slopes are dry, but also cut by deep furrows from the crest, which separates the valley from its eastern neighbour, the Raga-tsangpo.

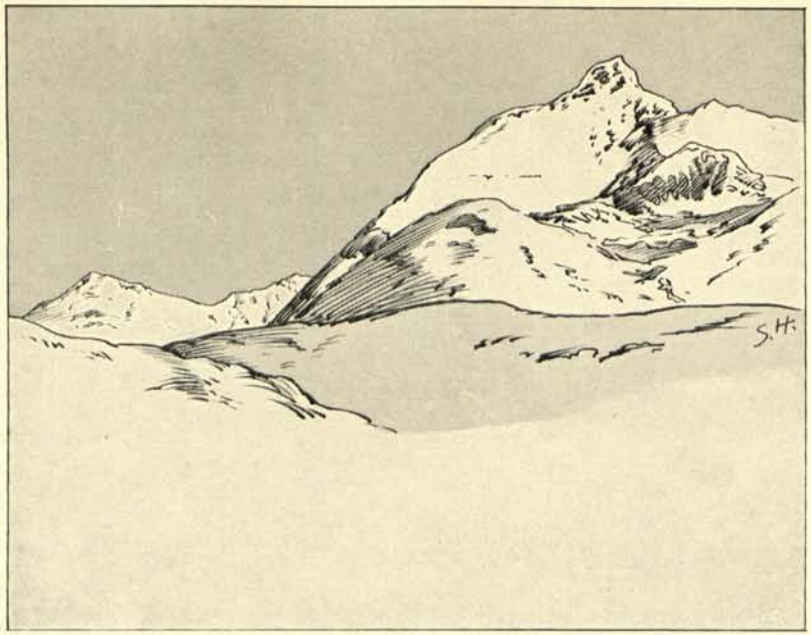
The rocks in which the Kanglung-shärki had cut its valley are sandstone; it had now a partly ice-covered brook. Even above the right tributary Nilung-kongma some tussock grass appears. At Lungle, Camp 164, the height is 5 251 m. Here a comparatively large tributary, Tiblung-nakpo, in the background of which some high snowy parts of Chomo-uchong appear, comes in from the south, between 3 m high terraces, and from the north Nilung-parva and Nilung-ongma, both small.

Below the little valley Tegung from the left side, where the rocks are sandstone, the valley becomes more narrow, deep and marked, and has a much more accentuated, peripheric character than the Raga-tsangpo and its tributaries. From the right side Ukchölung is a great, Yelung-kongma, Yelung-parva and Yelung-ongma small tributaries. The bottom of the valley is nothing but gravel, tussock-grass, swamps, ice-sheets, springs and more or less interrupted terraces 3 or 4 m high; the brook has about half a cubic m of water, perfectly clear, from melting snow and springs. Through the opening of the great tributary, Lombo-kanchen are to be seen the snowy peaks of Chomo-uchong, and even a small glacier. Above this valley are three smaller ones: Tsa-karpo-kablung, Tiblung-tinging and Ngo-taktak-lungchung. Through the right tributary, Rungchung, small snow-covered peaks are visible to the north, probably belonging to the Kanchung-gangri. Then follows from the left the great valley Lombo-kanchung, coming from the same snow-massive as the Lombo-kanchen. On the right side of the main valley the rocks are steep, on the left the slopes are moderate and rounded; but above these hills rise rugged rocks and finally snow- and ice-covered peaks. Only at the left side is the erosion terrace developed, on the right the river sweeps direct along the rocks. Avara is a valley from the left, and Tagelung another from the opposite side. At Yelung-marvo the bottom of the valley is only some 50 m broad.

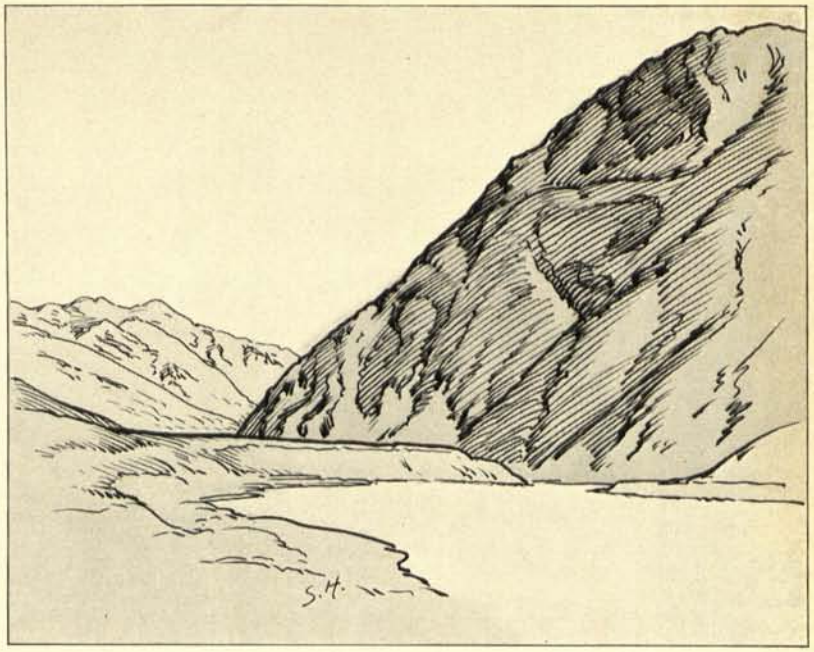
Finally the valley joins the Argäp-rong, which is the main valley and contains more water; it comes from N. 23° E., and the joint valley continues to the S.S.W.; therefore the road here turns in a right angle round the Chomo-uchong group, which, consequently, always remains on our left. At the junction the rock is porphyry. Kanglung-tsaka is a place where hot springs formerly existed, as can be seen from the concretions of sand and lime below the erosion terrace; the springs were destroyed not long ago, on an occasion when the river was much swollen.

The valley is narrow and the mountains on both sides steep and high; Tobo-nakpo is a valley from the left through which the heights of Chomo-uchong again appear to the S.E. The rock is here quartzite. At Pangsetak, Camp 165, the height is 4 916 m, giving a fall of more than 600 m from Kanglung-la.

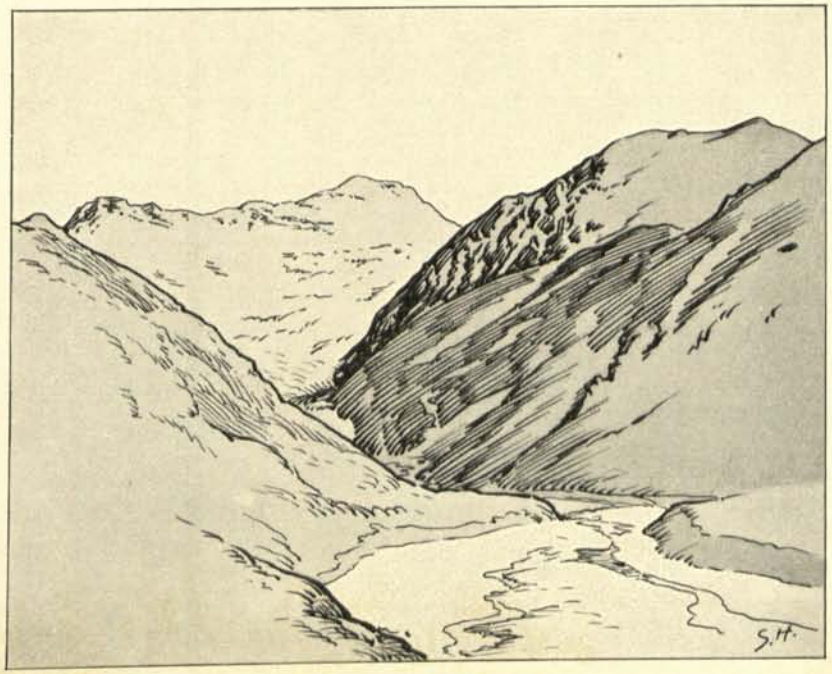
Below this point the erosion terraces are some 12 m high; Namchen and Nakie-lung are tributaries, below which the main valley becomes very narrow and wild; the mountains at the right side are steep, sometimes nearly perpendicular, as



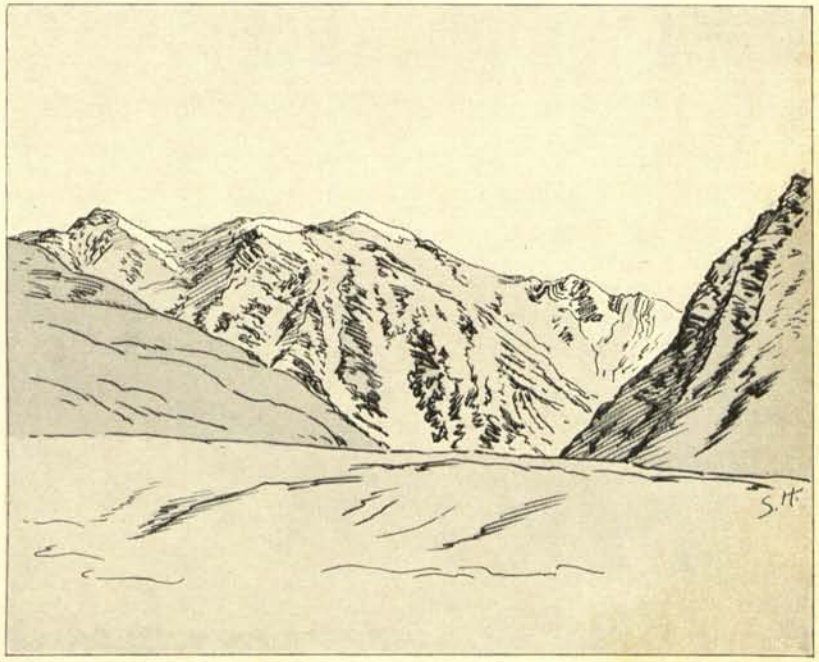
Looking up the Lombo-kanchen valley (May 24).



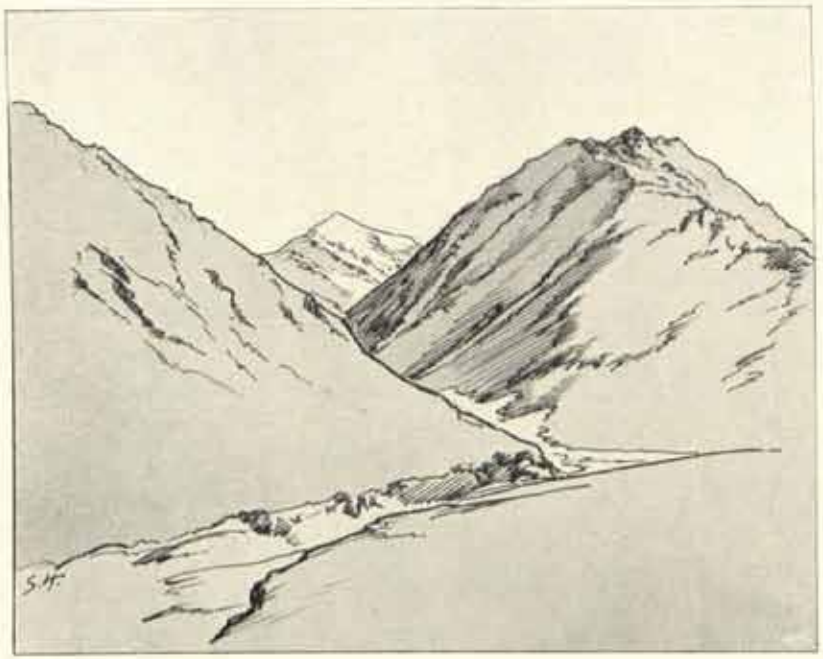
Looking down the Lombo-kanchen valley.

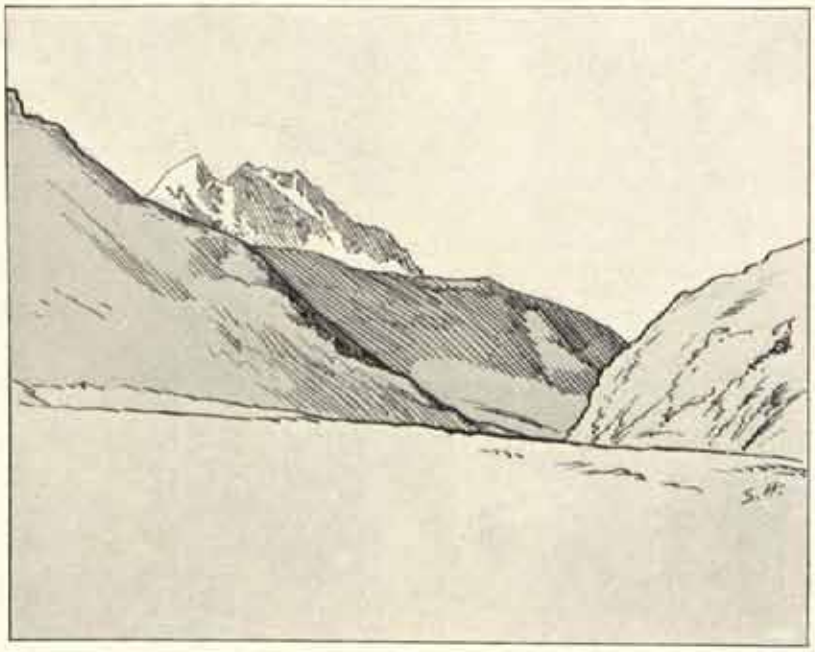


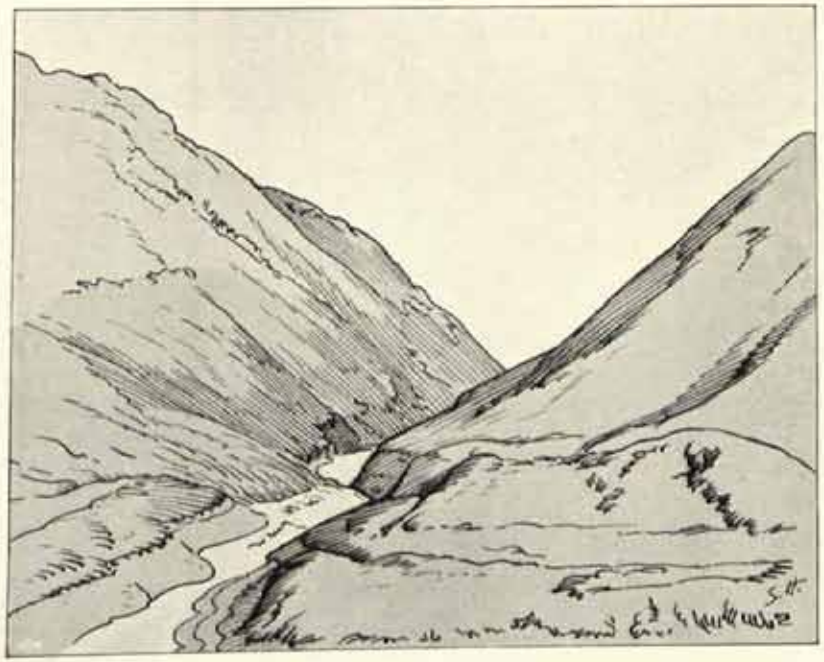
Looking up the Lombo-kanchung valley (May 24).

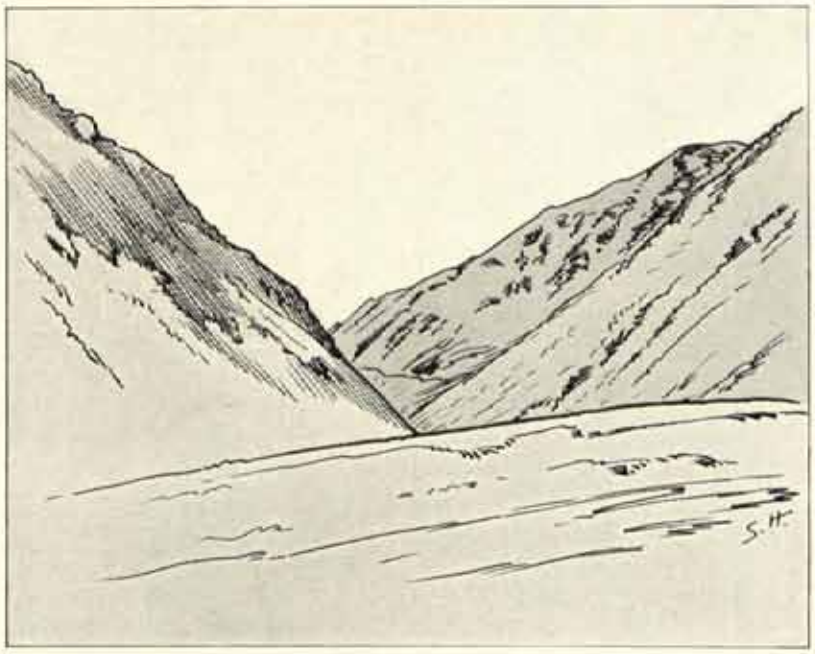


Lombo-kanchung; where the valleys meet.

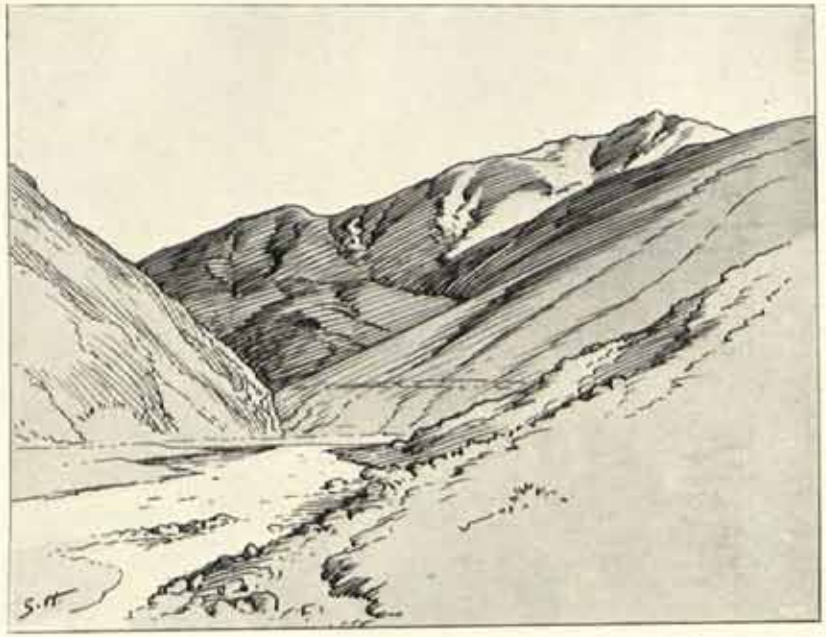






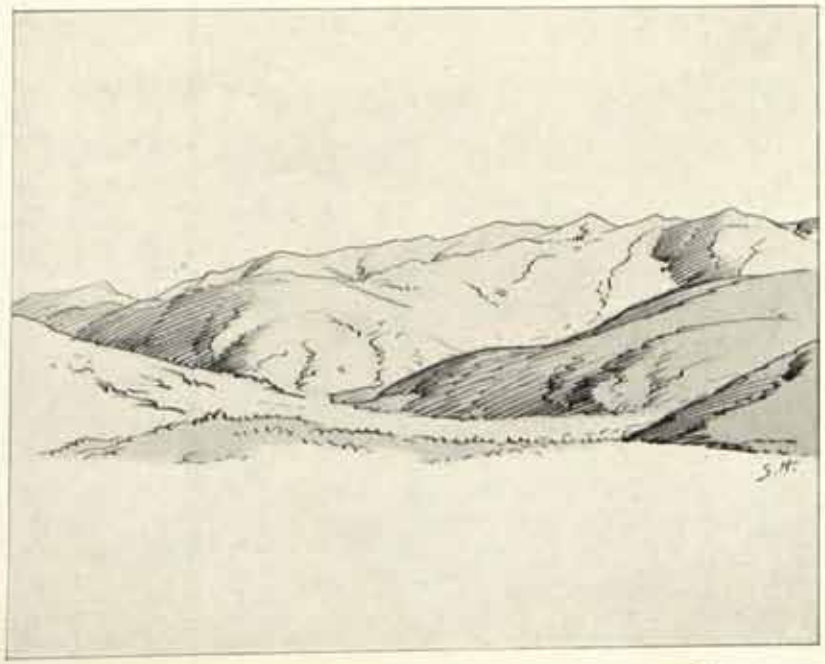


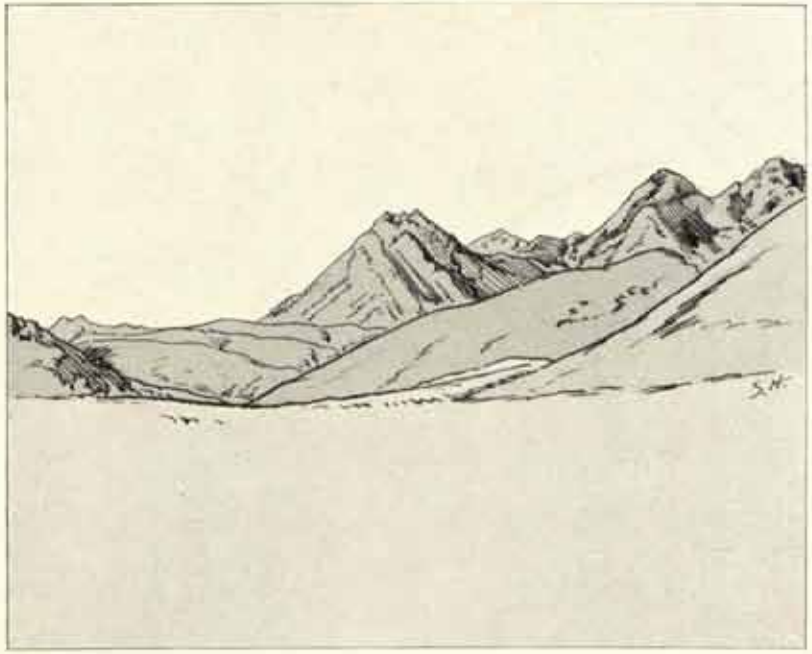
Different views from Camp 165.



Looking down the river from the mouth of Tagulung (April 20).

Looking up the valley from the mouth of Talung (April 20).





Views from Camp 167.

at Papky. Chu-chandong is a valley and Lombo-taktsän a massive, both to the left; Chünar are the mountains to the west. Here the main valley opens out more and more, the rock is grey schist and grayvacke-sandstone, the valley becomes open like a plain, and again makes a turn in a right angle, now to the W.N.W. From the right, Lablung is a valley with a brook, and Basang another with springs. Here the height is 4 796 m, Camp 166. The river, now called Kanglung-bup-chu or simply Rong-chu, has a little more than 2 cub. m at the point where it leaves the narrow valley; in the plain and at Saka-dsong it is called Sa-chu-tsangpo. West of Basang the mountains are called Serchen-tombo.

Continuing south from Basang an isolated hill, Korem-tevo, is left to the right. At Chu-sumbuk the river Kanglung-bup-chu receives the Yara from the Chomo-uchong. The bed of the former is broad, and has a 4 or 5 m high erosion terrace at its right side, whereas the left one is low; the Yara had about 1 cub. m, the Kanglung or Sa-chu only a little brook; the joint river continues N. 75° W. The name of the valley in that direction is Naga-goling. To the south its open plain is bounded by a ridge of low hills, which is also crossed by the *tasam*. The rise to the pass of this ridge, Gyabuk-la, 4 823 m, is very easy; on the southern side, towards the Tsangpo, the slope is more steep. From this pass the view of the Chomo-uchong is beautiful, with its several peaks, Chomo and Sevo, its ice- and snow-fields and its black rocky crags. Gya-la is a pass on its lower slopes, from where descends the valley Gyabuk. The valley from Gyabuk-la, where white quartz-porphyry and hard schist are found, is called Kyärkyä-bup, and is broad and open. At a promontory, Kyärkyä-tagmar, quartzitic sandstone forms the living rock. In the Kyärkyä valley, Camp 167 is at 4 575 m.

Not far below this point sandstone crops out at the mouth of the right tributary Pungra, which is formed by the two valleys Nakpo-chu and Chunchar. Ladung and Sheri are mountains in the neighbourhood. On the way down to the Tsangpo some small valleys join the Gyabuk brook, as Gaktsa or Gakbetsa, Mendong-kongma and Mendong-ok. The road then turns to the west along the Tsangpo, and my third crossing comes to an end at the junction of the Chaktak-tsangpo where the absolute altitude is 4 524 m.

The climate of the region just described was rather inhospitable even in May. In the beginning of that month the Shuru-tso was frozen all over, except a narrow strip along its southern shore. In many valleys, specially below springs, great ice-sheets had accumulated in the winter and still remained. My guides however pretended that the surroundings of Shuru-tso were usually regarded as being warmer than those of Amchok-tso, and they assured me that signs of old barley fields had been found on the shores of Shuru, but never on those of Amchok. The fact that I found the Shuru ice-covered but the Amchok open, although only a few days intervened between the two visits, does not confirm the assertions of the Tibetans.

The weather was almost always clear, but a hard western wind was very common. In the beginning of May, it was bitterly cold, when sweeping over the high crests near Angden-la. The wind does not whirl up dust and sand, for even at 10 days' distance the mountains on the northern side of Dangra-yum-tso were clearly visible. This probably depends upon the fact that the ground, at that season, is frozen; otherwise the corrosive power of the wind plays a very important part in Tibet. South of Angden-la the prevailing wind is said to come from S.W. The rains also come with S.W. winds. In the beginning of July the rain sets in; in August and the beginning of September the heaviest rains fall. At Raga-tasam, which is regarded as a cold place, even during the summer, the prevailing wind comes from W.S.W.; the spring is cloudy and windy.

On several occasions in the middle of May we had snow and hail on the southern side of the continental water-parting. The precipitation was, however, very short and sudden. As a rule the weather in the spring varies greatly from one hour to another; from sunshine to heavy clouds and hail or snow. Usually the morning is the best time of the day. The higher one comes the worse grows the weather; on the considerable heights north of Chomo-uchong we had the greatest amount of precipitation.

The big animals are here the ordinary ones; kyangs in the valley of Targo-tsangpo and at the upper Raga-tsangpo, antelopes and hares in the valley of Kyam-chu and Raga-tsangpo, rabbits everywhere, Arctomys, "Herodotos ants", in the higher regions of Chomo-uchong, wolves occasionally, wild geese, ducks and gulls at Shuru-tso and Amchok-tso, partridges here and there in the mountains.

The population is much scarcer than on the line of the second crossing. In the Karmuk-valley, on the southern side of Targo-gangri, there are tents and yak flocks. At Näven, near Camp 151 one tent and flocks of sheep. At Parva, Shuru-tso, 8 tents were pitched and another in a neighbouring ravine. At Tsargam-tsangpo, southern shore of Shuru-tso 2 tents, and near Dunka-la 4 tents and flocks. No tents were pitched at the northern side of Angden-la, and at the southern side we passed only old camping places, perhaps rather resting places of caravans than regular camps of nomads. In the valley of Kyam-chu-tsangpo there were seen tents at several places, for instance 4 at Kyam. In the eastern half of the plain of Amchok-tang many nomadic camps were pitched, and at Amchok-yung 8 tents. On the eastern shore of Amchok-tso we saw 3 tents with great flocks of sheep and yaks. In the Serma valley one tent and yaks. The nomads who pass their winter and spring on the Amchok-tang have their summer-dwellings in the Serma valley, as could also be seen from numerous camping places, now uninhabited. In the upper Serma-lartse a rich nomad owned 300 yaks. In the Lungring valley were now 7 tents. Temporary camping places and heaps of *argol* were seen in other valleys visited at other seasons. At the right side of the Raga-tsangpo great herds of yaks were occasionally seen, and 3 tent villages. Travelling merchants are a

very rare sight; only once we saw such a camp on the Raga-tsangpo, 3 white and blue tents and 30 ponies. As soon as one reaches the *tasam* or Raga-tasam some more considerable traffic of caravans is seen, always yaks. The *tasam* is therefore like a great number of parallel paths, as the yaks go in a compact mass at the side of each other. Round Raga-tasam there are many now uninhabited camping places. At Raga-tasam itself 12 tents were pitched, several of them belonging to the authorities of the road. There is also a kind of bazar-merchants with a black tent. Above Raga-tasam are signs of many camping places. Round Camp 162 nomads dwell only in summer. South of Kichung-la a tent was pitched at the very considerable height of nearly 5 000 m. Near Basang were a few tents, but more were expected in the summer. At Sa-chu only 3 tents were seen, but several are pitched farther west along the river. At Kyärkyä and the Tsangpo there are many ruins, for instance one of an old *dsong*, and one of a nunnery as well as of many houses long ago abandoned, and fields of barley no longer cultivated. There is a whole abandoned village, Yü-ü-par, and Chandö is the last group of ruins close to the Tsangpo. Only one tent was now pitched here.

CHAPTER XXXII.

THE FOURTH CROSSING.

If my third line of crossing was a rather irregular or, at any rate, diagonal line, the fourth crossing is almost straight meridianal and is therefore of great importance for the knowledge of Central Transhimalaya. It begins from the village of Ushü, Camp 395, near the Tsangpo, and at a height of 4 563 m and proceeds north to Camp 411 at Teri-nam-tso and at an altitude of 4 684 m, the difference in height between starting and end points thus being only 120 m. The continental watershed on this line is Sangmo-bertik-la, 5 820 m high. The distance from Ushü to the pass is, in a straight line, 88 km, and along the road 108,1 km, and the difference in height 1 257 m. To the north the distance from the pass to Camp 411 is, in a straight line, 90 km, and along the road 121,2 km, and the difference in height 1 136 m. Thus the fall to both sides is about the same, and, as usual, very slow.

The season of this journey is May, 1908.

Ushü or Ukshü is a village with a few stone houses in a little valley from the Chomo-uchong going down to the Tsangpo. The rocks are sand-stone. A little above and west of the village is a small pass, Ukshü-la, and beyond it the road goes up and down amongst hills and rocks, leaving to the south a valley bound to the Tsangpo and containing a small lake. The rock is phyllitic schist. Another winding valley comes from the rather steep little pass Gya-la, and allowing of a magnificent view all round the horizon. Here the rock is lateritic schist. To the S. 26° E. and S. 18° E. rise two very high snow- and ice-covered massives, obviously belonging to the northern Himalaya range north of Tsonka-dsong. Between the two is the pass Shange-la. Quite near to the S.S.E. beyond the ramifications of Gya-la is the great valley of the Tsangpo, which here is divided into several branches. To the S.W. is a saddle with the pass Sukba-la, and beyond it and the Tsangpo is Nevu-la, surrounded by snowy mountains. On this meridian the water-parting range of the Himalaya is very considerable and everywhere covered with snow and ice. To the W.S.W. and W. in our neighbourhood are the mountains which stand between the Tsangpo and the Sa-chu of Saka-dsong; N. 60° W. is a

THE SA-CHU VALLEY, LOOKING WEST.

The Kanglung-la

smaller peak near Pasa-guk; N.W. some moderate ridges are seen; N. 25° W. and N. 16° W. are some snowy peaks and between them a ridge with some snow on the southern slopes; they belong to the Kanchung-gangri; N.N.W. is Basang, touched by the third crossing. To the N. 29° E., N. 37° E. and N. 43° E. are the three highest peaks of the Chomo-uchong; from the first of these two glaciers go N.W.; N. 77° E. is a smaller peak. The view from Gya-la is curious; on all sides one is surrounded by a heavy sea of ridges and ranges, only here and there covered with snow.

From Gya-la the road descends to the plain, crossing a brook from E.S.E. with half a cubic m of water, the same which, lower down joins the Kanglung-bup-chu under the name of Yara. Near the western foot of Chomo-uchong there are many great erratic blocks of hard, green schist. Camp 396 on the Kanglung-bup-chu is at 4 780 m; it is close S.E. from Camp. 166, Basang. A little higher up the road enters the valley Lamlung between rocks of dark, green schist. The ascent to the pass Lamlung-la is rather steep; round this pass conglomerate stands in living rock. The magnificent massive of the Chomo-uchong is again visible, with its culminating peaks and several other summits, one of which, in the middle of the group, is a regular cone and everywhere covered with eternal snow. Small glaciers, short and steep, go down from the *nevées*. In connection with the fifth crossing we shall find it easier to distinguish the orographical situation and importance of Chomo-uchong. To the N.N.W. a part of the Kanchung-gangri may be seen; the range was here called Känchung and Kämchung; one informant said Känchung-Kanchung-gangri. To the north the Transhimalayan system looks surprisingly low, and no high snow summits are to be seen. The whole is, as usual, a confusion of innumerable ridges and ranges.

On the north side of the Lamlung-la the road for some distance keeps to the heights before it reaches the upper parts of tributaries, bound to the Kanglung-bup-chu. A ridge between two tributaries has to be crossed in a low pass, before reaching the valley Nämchen, where Camp 397 is at a height of 4 982 m. The district is called Kebuk. A direct road goes from here to Saka-dsong, crossing a comparatively high pass, Dorang-la or Dorang-tagla-shar, which is situated in the same range as Lamlung-la. This range must be a connecting link between the Lunpo-gangri and Chomo-uchong.

The Nämchen brook goes out into a broad open valley west-east in direction, joining the Kanglung-bup-chu; on its northern side the road proceeds to Telep-la, 4 974 m, which is only a very flat and low secondary threshold in sandstone; the neighbouring Gara-la is a little higher or 5 053 m. Camp 398, Tangma-ni, is at 4 922 m.

From Tangma-ni my road goes N.N.E. up through the valley which pierces sandstone and has a very disagreeable bottom, rotten ice, gravel, tussock-grass and rabbit-holes. Kyungtsang is a tributary from the right side, through which a direct road continues up to Camp 399. The guides, however, preferred a roundabout way

to the east, which is said to be more comfortable, though it crosses the double threshold Shalung-la, 5,320 m high; between the two passes is the valley Shalung-lungpa, a tributary to Gyägong, or, as it is called lower down, Kyungtsang. From Shalung-la the Chomo-uchong again presents a beautiful view, and now, when seen from the north, the mountain group does not look like a knot or accumulation of peaks, but like a real, sharp range with several peaks in a line. In this perspective it became clearer than before that the Chomo-uchong is a link between Lunpo-gangri and the comparatively low range which is situated between the Raga-tsangpo and the Tsangpo.

Camp 399, in the Gyägong valley, is at 5 114 m. From here three different roads start northwards through the different valleys and over three passes, each simply called Gyägong-la; they are situated between N.W. and N.E. My route crosses the eastern Gyägong-la, which is surrounded by sandstone. From this pass a few flat snowy peaks are seen to the north, draining to the Chaktak-tsangpo. In the northern Gyägong valley, at Memo-chusän, some hot springs, surrounded by concretions of lime and sand, crop out from the ground; one of them had a temperature of 34,2°, in another the water was boiling. At Camp 400, 5 333 m high, a real ice-lake had formed in the valley. This lakelet is the centre of a little isolated basin without outlet; from its northern shore the ground again rises slowly to the flat pass Damche-la, 5 418 m high.

From this pass a little brook descends N.W. to the Chaktak-tsangpo, along the left bank of which the road runs north. The Chaktak-tsangpo goes out from the southern end of Lapchung-tso, a small lake of a height of 5 193 m and surrounded by hills. Having crossed the Damche-la and reached the comparatively open country of Lapchung-tso, one gets a much clearer and sharper view of the Kanchung-gangri than even from the south. The northern side is much richer in snow than the southern, and three moderately large, and several smaller glacier are seen, all of them short and steep. Proceeding north from Camp 398 we have thus crossed two important passes, Gyägong-la and Damche-la, between which the little basin of Memo-chusän is situated. The Shalung-la, on the other hand, is without any im-importance, and could easily have been avoided. This orography seems to prove that Gyägong-la belongs to the same range as the Lungring-la near Amchok-tso, or the western-most end of the Nien-chen-tang-la, whereas the Damche-la is situated in the Kanchung-gangri.

From Lapchung-tso, Camp 401, the following observations are made: to the S.S.E. is a valley Salung-changtang which seems to be a tributary of the Chaktak-tsangpo; south-westwards are the high peaks of Kanchung-gangri, also called Kang-chung, Känchung, Kamchung, Kämchung or Lap-känchung by different informants; I have accepted the most ordinary appellation, Kanchung. To the S. 44° W. is a saddle, Tsigu-la, between two humps of the Kanchung, by which another road from Camp 398 goes to Lapchung-tso. The region north of Tsigu-la and Kanchung-

THE LUNPO-GANGRI FROM CAMP 378

GEN. STAB. LIT. ANST. STHLM

THE KANCHUNG-GANGRI FROM CAMP 401

gangri is called Räruk. To the S.W., beyond a little valley, Nanchü-gongyoni-lungpa, the Chaktak-tsangpo pierces the Kanchung-gangri in a wild and narrow valley, which seems not to allow of any traffic; the high Kanchung peaks S.W. of Lapchung-tso are, therefore, left to the east by Chaktak-tsangpo. To the W.S.W. is a valley Luma-nakchen-nakchung and to the N.W. the valleys Salung-nakchung, Salung-nakchen and Pencha; a fairly large valley from the same direction is called Sosänang. Sago-gangri is a small and flat snowy massive to the N. 35° W., in the neighbourhood of which is situated the valley Tsalung-karpo. To the N. 30° W. a considerable valley opens out, called Gyandor-ngundor and leading to Gyandor-ngundor-la, which may be situated on the continental water-parting, for a road is said to lead over it to Teri-nam-tso. To the N. 5° W. is a small height with some snow, Sangmü-rigyü. From all the small valleys visible to the N.W., N. and N.E., brooks run down to the Lapchung-tso, and from this lake issues the joint river, Chaktak-tsangpo. The sources of this river are thus situated on the southern slopes of the principal water-parting range, which I have called Lapchung.

The road follows the eastern shore of the lake northwards. There are many blocks of quartz-porphyry but no living rock; there are swamps and pools covered with thick ice, low, close grass, and, further north, the soil becomes sandy and more comfortable for the traveller. The northernmost part of the lake is narrow, and here the river enters which is formed by the several northern tributaries and in fact is the upper course of the Chaktak-tsangpo. The road crosses several small deep-cut brooks from springs; they go directly to the lake without joining the Chaktak-tsangpo; the road keeps to the eastern side of the broad open valley, where there are rounded hills, separated from each other by small tributary valleys; the mountains at the western side are higher. The grass is fairly good. Some pasture grounds also have special names, probably from valleys from the eastern hills, such as Lapchung-shungra, Dombe-hloma and Dombe-changma.

Camp 402 is situated in the entrance of the valley Sang-bertik or Sangmo-bertik at a height of 5 245 m. Its bottom was (May 9) full of solid, hard ice. It comes from the range with the continental water-parting. It is surprising to find just at the foot of this most important range a plain, so extensive and level as the one north of Lapchung-tso. But, on the other hand, this range has more of the Chang-tang character than of the peripheric accentuated sculpture. We found something of the same kind south of Angden-la, where, north of Amchok-tso there is another great plain.

From Camp 402 some interesting observations are made, as explained by my guides. To the N. 61° W. is a very low and flat threshold, Dicha-la, situated in the broad, long valley between Kanchung-gangri and Lapchung, through which a road proceeds to the N.W., reaching the lower Buptsang-tsangpo without crossing a single pass, and with only insignificant thresholds amongst hills. The Tibetans assert there is a longstretched *tanga* or plain between the two ranges. West of Dicha-la a road

branches off to the west to Buptö, but that road crosses the Kanchung-gangri in a high pass. That the two ranges are separated from each other the whole way to the N.W. is clear, but it is difficult to tell whether the Dicha-la is on the continental water-parting or not; most probably it is.

From N.W. over to N.E. the Lapchung range has some low summits with eternal snow. The Sangmo-bertik-la in this range is not the only pass leading to the Teri-nam-tso, for there is said to be another road to the lake a little farther east, which, however, has to cross several passes. To the N. 85° E. there is reported to be a pass, Nakpo-kongdo-la, with a road to Targo-barong-la or Parung-la, the surroundings of which we saw from the Shuru-tso. To the S. 60° E. rise some peaks with snow and ice called Nakpo-gongrong-gangri, obviously a part of the Kanchung-gangri [1]; to the same system belongs the higher Tsa-timyang-gangri visible to the S. 38° E. Through a little opening S. 13° E. the Chomo-uchong may still be seen; S. 7° E. is a snow-covered part of the Kanchung-gangri, and S. 6° W. and S. 14° W. other parts of the same. Tsalam-nakta-la is reported to be on the same range as Sangmo-bertik-la and one day farther east. As far as I could judge from my third and fourth lines of crossing, the eastern half of the Lapchung range describes a curve and becomes meridional and parallel to the Targo-gangri. As the country between my lines of crossing is completely unknown, the orography may here be more complicated than I have represented it.

The rise of the Sangmo-bertik valley is not steep, but it is stiff on account of the enormous height. There is no living rock, everything is detritus, and the bottom and the sides of the valley are full of blocks and gravel of gray granite. There are frozen springs, some snow, red and yellow moss, rabbit holes, and some very low grass, such as the wild and tame yaks like. Beyond Camp 403 which is at 5 586 m, all vegetation, except moss, has ceased; everything is gravel and small blocks; all fine material has been washed away, and the ground is therefore extremely uncomfortable for the traveller. This road is obviously not much in use, as more practicable passes are situated to the west and east; still there are two small cairns on the summit of the pass, and signs of old camping places on both sides.

Sangmo-bertik-la is 5 820 m high which may be considered as a respectable height for a road. Just west of the pass there descend three small glaciers, and another comes from the east. The topography is very unfavourable for a distant view; hardly anything can be seen, except, to the south, a little part of the Kanchung-gangri. To the north everything is hidden by near mountains. On the southern side all blocks and gravel are gray granite; on the pass, quartz-porphyry, while north of the pass, appear diabas and porphyritic diabas, which, near Camp 404, stand in living rock. The descent is fairly steep until the bottom of the north-going valley is reached, where the ground appears to be perfectly level. Camp

[1] On my preliminary map in "Trans-Himalaya" this name has been misplaced.

404 is at a height of 5 435 m. On the northern side there are also heaps of blocks and gravel.

The valley from the pass slowly develops and becomes more and more considerable, with a brook amongst ice-sheets between terraces, but bounded by no high mountains; it is wide and open and has the real Chang-tang character. The rock is phyllitic schist. From S. 82° W. enters a left tributary, in the prolongation of which a snow mountain is visible, obviously one of the peaks of Lunpo-gangri. Through this valley a road is said to proceed to Buptö, crossing a pass two days off and called Kartse-martse; there must, of course, be a second pass, in Kanchung-gangri, though my guides pretended there were several small and easy passes. At Camp 405 the height is only 5 121 m.

The valley is very straight to the N.N.E. and one or two kilometres broad; the terraces become less marked and the brook slowly disappears in the gravel of the bottom. Only after rains is the brook strong enough to reach the Soma-tsangpo. The valley is situated between two northward directed ramifications from the Lapchung range, and from each of them small ramifications are directed towards the valley with small tributaries between them. At Camp 406 the height is 4 964 m, so the fall northwards is regular and rather slow. Sangmo-yung is the name of the valley.

Below this camp the valley becomes still more open and undecided. The mountains to the S.E. or right are low, only far to the E.S.E. are there considerable snowy mountains; to the N.W. and W. are also some higher peaks and groups. To the N.N.E. is an easy opening between hills, like a gate, which is left to the left by the road that, instead, turns N.E. and crosses a ridge of low hills with a threshold 4 947 m high only. From this a great plain is seen to the east, here and there with small hills and promontories from neighbouring mountains. To the N. 61° E., S. 84° E. and generally E.N.E. are several high peaks, hardly visible on account of snowfalls. It seems, however, likely that the upper Soma-tsangpo flows over this plain and receives many tributaries from the northern and western sides of the Shuru range, which forms the eastern boundary of the plain. Another very low threshold of hills is to be crossed before a very flat depression is reached, with, in its middle, a pool called Buchu-tso; this is said to dry up entirely during the summer, but gets filled again during the rainy season. It is separated by a very low ridge from Kangmar, Camp 407, at 4 783 m. From this camp a well determined range is seen to the north, which I have called the Teri-nam range, as being situated on the southern shore of Teri-nam-tso.

The road continues N.N.E. and N.E. over the perfectly level plain with very low hills to the right and high hills to the left. The broad and open valley of the Soma-tsangpo is crossed. To the S. 85° E. it stretches 3 or 4 days' journey and is bounded by a flat snowy range with several more considerable culminations. From the same mountains the Soma-tsangpo comes down between the Teri-nam range and

the Lapchung range. The valley of the river continues to the N. 72° W. Finally the river, in a rather narrow passage, pierces the Teri-nam range and turns N. and E. and empties itself into the lake. The river, which also is called Nyaga-tsangpo or Soma-nyaga-tsangpo, was (May 17) divided into four very shallow branches, with about 8 cub. m of water a second. After rain it is unfordable.

Continuing N.E.-wards the road crosses a secondary threshold, Lachung-la. Camp 408 is situated at a spring, Daksha-lungpa on a height of 5 150 m. The rocks consist of marble, sandstone and black schist.

Dongchen-la, or Dong-la, 5 113 m, is secondary and situated in quartz-porphyry. On its northern side the valley Yung-nagring goes, with a small brook, to the N.N.E. The surrounding country is called Naktsang-mayma and Naktsang-sange; to the east is Ngamo-buk; north of Dongchen-la the country was said to be called Nyaga-changma. The mountains on both sides are comparatively low and consist of quartz-porphyry. At Camp 409, 4 714 m high, well developed beach-lines indicate the former existence of a lake, which has now left only some swamps in its old depression.

From Camp 409 the direction becomes N. W. up a little valley to the pass Teta-la, 4 958 m. The valley is narrow, arid and dry; sandy schist, quartzite and granite prevail in the surrounding mountains. The view from Teta-la reaches very far and gives a strong impression of the general uniformity of the mountains, where only here and there higher snowy groups rise above the rest. The lake Teri-nam-tso is seen stretching two short days to the east and two days to the west, becoming narrower eastwards and being at its broadest towards the N.W. The desiccation lines are extremely sharp, in different colours and tones, and round the water-line there is a narrow belt of white salt. At the southern shore is a lagoon, green with algæ, and called Dakba-tso. West of it is a comparatively deep gulf between the two capes visible to the N.W. and N. 17° W.; to the N. 9° E. is a red promontory called Domar or Dongar, and to the N. 18° E. another called Sonyak; Kokchen, Kokchung, Rapta and Kyüti are parts of the small ridges following the southern shore eastwards. Direct N.E., at the northern shore, is an island called Tibu-kare or Nam-do, "the sky stone", to which the nomads go out on the ice during the winter; the shore opposite the island is called Toba-kapchen. At a great distance to the N. 18° E. is a small snowy mountain, and N. 30° E. a group of flat, snowy peaks; N. 82° E. is a lower, snowy group and to the N. 89° E. a comparatively low region north of Targo-gangri, the highest summit of which is to be seen to the S. 80° E. From this point, or the west, the Targo-gangri presents itself as a very sharply defined range with a series of peaks, not much higher than the crest. To the S. 69° E. is a smaller snowy mountain, and S.E. several others belonging to the Transhimalaya, that is to say, to the ranges west of Shuru-tso. In that direction the highest mountains are visible; to the N.W. high peaks are rare, only to the N. 52° W. is one visible, though not of considerable height, but N. 31° W. there is the

mighty Sha-kangsham. Ngoring or Nguri is a little ridge along the northern shore of the lake. Tsirang-tso is a small lake just east of Teri-nam-tso. Of the Dangra-yum-tso nothing can be seen; the distance between the two lakes is said to be four days. On the Teri-nam-tso there was now no ice at all, as it began to break up in the first half of April. The water is undrinkable, but there are fresh springs along the shores. The height of the lake is 4 684 m.

As in 1907, the May of 1908 proved to be very cold, cloudy and windy. The weather of May in the valleys on the southern side of the Transhimalaya was more rough and inhospitable than the weather of April on the open Chang-tang plains. Regular snowfalls were not rare. The prevailing wind came from the S.W. On May 1 the brook of Kanglung-bup-chu, at a height of 4 780 m, was still covered with rotten ice, sufficiently strong to bear the weight of the caravan. May 8 the Lapchung-tso was still covered with compact ice. The ice of the lake does not break up before the beginning of June, when the ice of the pools and brooks in the surroundings has already disappeared. The climate of Lapchung or Lap, that is to say the region round Lapchung-tso, is regarded as particularly cold, which is not surprising, remembering the great height. North of Sangmo-bertik-la we had real winter-weather, with blinding snowstorms, in the middle of May. In the latter half of May the southern shore of Teri-nam-tso proved to be a very windy region, specially after noon; the wind was always S.W.

The region of Lapchung is rich in animal life, kyangs, antelopes, hares, wild geese, partridges, ravens etc. On the Sangmo-bertik-la we saw 8 wild yaks. The yaks avoid the roads, but otherwise they are common in the higher parts of the Transhimalaya. An old hunter, who had killed many yaks, calculated that some 3 000 yaks had their haunts on the southern slopes of the Lapchung range, but hardly any at all on the northern. Kyangs, pantholops and goa antelopes were common north of Sagmo-bertik-la. On the Dongchen-la we saw 24 Ovis Ammon.

The population is very scanty along this line and, as usual, diminishes from south to north. The Ushü village was said to have 150 inhabitants, most of whom, at the time of my visit, were spread among the surrounding mountains with their flocks of sheep; in late summer they return to look after their barley harvest. Therefore they are semi-nomads living even on the shores of the Tsangpo; further west there are full nomads on the banks of the river.

North of the Gya-la we saw only one tent, and in the valley north of Lamlung-la 7, with great flocks of yak. In the valley between Lamlung-la and Telep-la were 5 tents; at Kyung-tsang one and in the Gyägong valley 3 tents. In the valley north of Sangmo-bertik-la, below Camp 405 were many signs of camping- and pasture grounds. Here many *mani*-walls indicated the neighbourhood of Mendong-gompa. Near Camp 407 were 10 tents in all. On the Soma-tsangpo 2 tents. In the valley Yung-nagring one tent and great flocks of yaks and goats. Near Camp 409 were

4 or 5 tents with flocks, and south of Teta-la 3 tents. On the shore of Teri-nam-tso two tents and flocks.

The usual difficulties in determining the administrative boundaries are encountered on this line of crossing, too. Bongba-changrang is the district of Bongba which is north of Sangmo-bertik-la, S.W. and S.S.W. of Chokchu and east of Kebyang. All the way to Sangmo-bertik-la the tribute is said to be paid to Saka-dsong, but north of the pass to Bongba-changrang. Camps 405, 406 and 407 are said to be within the district Bongba-chushar, which has to the west Bongba-changrang, to the north Soma-tima and to the east Soma-lobruk; north of Soma-tima is Chokchu, which, like the whole of Bongba, is under the direct jurisdiction of *Devashung* in Lhasa. Further east is Targo-largyap-changma.[1] The district of Bongba-chushar is subdivided into many small districts, as Deva-hloma, Deva-kibuk with Camp 407, Deva-changma, Deva-doma, and Deva-tesa; the word *deva* is said to mean direct dependence on *Devashung*. The region round Camp 410 at the southern shore of Teri-nam-tso is called Sangye-ngama-buk. It is a part of the Lavang district which is said to belong to the Saka-dsong province. Nyaga-changma is north of Tseti-la and west of Camp 410. North and N.E. of Teri-nam-tso and stretching eastwards to Dangra-yum-tso is Chokchu, a district with a chief but no governor. The following districts north of Sangmo-bertik-la are reported as paying their tribute to Saka-dsong: Chang-rang, Chushar, Sangye-ngama-buk, Chugtso, all being under the *Devashung;* and Soyung or Soma-yung, Sotib or Soma-tima, Sochang or Soma-changma, Targo-largyap-changma, Patö, Targo-largyap-hloma, Rusar, Hlorbu and Chechen, all belonging to Labrang or Tashi-lunpo. The tribute, which is said to amount to 7 000 *tenga* in all, is collected by officials from Saka-dsong; most of the tax is paid *in natura*. During my visit to Kangmar some 50 nomads had gathered there to pay their taxes to the collectors from Saka-dsong. Much of the information given by the nomads about the administration is unreliable. Thus for instance one informant affirmed that Sangye-ngama-buk paid its tribute to Naktsang, though otherwise it belonged to Saka-dsong.

The *serpun-lam* or gold-inspectors' road goes from Lhasa to Dölung, Guring-la, Shansa-dsong, between Targo-gangri and Dangra-yum-tso, through southern Chokchu, and further westwards as will be related hereafter.

On the eastern shore of Lapchung-tso there is an important road, as is best seen just along the shore, where at least fifty pathways, trodden by innumerable sheep, run parallel to each other; for the eastern hills force the caravans to keep to the shore; further north, on the open plain this road seems to disappear, for here every caravan takes its own path. This great road is said to come from Tsongka-dsong and proceed to Bongba-changrang and Chokchu; not far from Lapchung-tso it divides into 5 branches going to 5 different passes in the N.W. and north. The

[1] Or Targo-largäp.

branch over Dicha-la seems to be the most important; it is chiefly used by salt merchants, collecting salt at Tabie-tsaka and transporting it on sheep *viâ* Lapchung-tso to Tsongka-dsong and other places in southern Tibet. This information, which I had no opportunity of controlling myself, is so far interesting that it indicates the existence of a broad and open valley between the Kanchung-gangri and the Lapchung range; theoretically we could be pretty certain of its existence, and in fact it seems to be more convenient than the road along Buptsang-tsangpo and over Samye-la, for it is said to be more used than this, in spite of its being a little longer. The same road is said to be used by many pilgrims who, on their way to Kang-rinpoche or Kaylas, take the great *tasam*, but returning follow the northern road, thus forming the whole pilgrimage into a *kore* or holy circle.

From Raga-tasam a road goes to Ombo at the northern shore of Dangra-yum-tso; this road is said to cross only one pass, Tsalam-nakta-la, four days from Raga-tasam and not so high as Sangmo-bertik-la; probably this road leaves both Targo-gangri and Dangra-yum-tso to the east; this statement can hardly be correct, for before reaching Tsalam-nakta-la in the Lapchung range one has somewhere to cross the Kanchung-gangri. As a rule it is difficult to fix the passes from native information; if a pass is easy and convenient it is often ignored altogether.

Finally, a road from more easterly tracts joins my road on the Dongchen-la. From Kangmar 5 days northwards are reckoned to the *serpun-lam*.

CHAPTER XXXIII.

THE FIFTH CROSSING.

The meridional line of depressions situated along 86½° East. long., and including Tang-yung-tsaka, Dangra-yum-tso, the valley of lower Targo-tsangpo and Shuru-tso, may in some respects be regarded as a very sharp orographical boundary line in the central part of Transhimalaya. The mountain ranges east and west of that line are without any connection with each other. To the east of the line latitudinal ranges prevail; to the west the Targo-gangri and Shuru range are meridional and belong to the highest of the whole system. Only south of the Shuru-tso there is, undoubtedly, a direct connection between the Pabla and the Kanchung-gangri.

So far we have considered my four eastern crossings of the Transhimalaya. Comparing the four water-parting passes with each other we find that they become lower from west to east: Sangmo-bertik-la = 5 820 m, Angden-la = 5 643 m, Chang-la-Pod-la = 5 573 m and Sela-la = 5 506 m. Then follows Khalamba-la with 5 200 m. This is, however, a mere chance, for were the heights of all the intermediate passes known, we should certainly find many irregularities, and if we continue eastwards the Guring-la has 5 972 m, and is higher than all the others. Continuing westwards from Sangmo-bertik-la we shall again find the passes becoming lower. All my four eastern lines cross the continental water-parting in passes situated on the crests of ranges. So is also the case with the three last passes farthest west: Surnge-la, Tseti-lachen-la and Jukti-la. Only the fifth pass, Samye-la, proves an exception as being situated between two ranges, not on the crest of one range.

My fifth line of crossing begins at Chunit-tso, Camp 371, 4 747 m high, and comes to an end at Ushü, Camp 395, near the Tsangpo, and 4 563 m high. Only the northern half of the line is meridional, the southern runs N.W.—S.E. as dictated by the direction of the ranges. The culminating point is the Samye-la, 5 527 m high. The difference in height between Chunit-tso and Samye-la is 780 m at a distance of 113,6 km in a straight line, and 125,7 km along my road; the difference between the Samye-la and Ushü is 964 m at a distance of 101,5 km in a straight line, and 163,6 km along my road.

The time of year in which this journey was undertaken was April, 1908.

From Camp 371, where the brook of Lungnak-bup-chu goes out into Chunit-tso, our road proceeds straight south on the arid plain at the western shore of Chunit-

THE AKSAI-CHIN LAKE FROM CAMP 302.
(VIDE VOL. IV.)

LOOKING SOUTH FROM CAMP 373.

A MOUNTAIN RIDGE NEAR CAMP 375.

LOOKING SOUTH FROM CAMP 375
(TO THE LEFT A PART OF LUNPO-GANGRI IS SEEN).

tso. The lake is completely frozen. The water is slightly brackish. A meridional range follows the eastern shore of Chunit-tso. Leaving the lake the road slowly ascends amongst hills with some ravines going to the lake; there are also some springs surrounded by great ice-sheets. The prevailing rock is light yellow granite; otherwise all hills and slopes are full of detritus, fine gravel and coarse sand. Camp 372 is at 4 846 m and a little further south is Nima-lung-la at 4 920 m. The view to the south is surprising: a gigantic range closes the horizon in that direction and there is a series of peaks with eternal snow and with glaciers between. A great plain separates us from this range, and there are no obstacles between Nima-lung-la and the northern foot of the range.

From the pass the road goes gradually down to the plain, where the soil is sometimes covered with gravel and dark sand, and perfectly arid, sometimes with swamps and grass; at some places it is yellow clay formed into tables and ridges by wind and water. The swamps are called Kole, a little brook with bad water Churu, and the region round Camp 373 Gyamra, 4 784 m. high,

From Camp 373 the road goes S.W. to avoid the hills on the left side, where a little pass, Dung-la, is situated. The soil is generally perfectly arid, fine, hard gravel; sparse, yellow patches of miserable grass are seen; good grass is only found round the springs and on swampy ground. It is surprising that these parts of Tibet are so completely arid, whereas in some of the great latitudinal valleys of northern Chang-tang there are places with excellent grass; but there the ground consists of fine dust and sand, here only of gravel.

Quite close to the east of our route rises a considerable, snowless range of prismatic form, which seems to be the N.W. end of the Kanchung-gangri. To the west are lower, arid hills, bounding in that direction the plain and its extensive swamps. To the W.N.W. and N.W. we see the very great valley of Buptsang-tsangpo, between a moderate range to the N.E. and the very mighty Lunkar range to the S.W.; far to the W.N.W. are seen some high peaks and ridges with eternal snow, being parts of the Lunkar. At Camp 374, 4 806 m high, a spring issues in a ravine with some grass; such places amongst the hills are real oases in this very arid land.

Where my route first touches the Buptsang-tsangpo the river was divided into several branches, some of which were frozen; the volume of water could amount to 5 cub. m. a second and the breadth of the valley was about 6 km, and its soil very level. At the right side the hills, covered with gravel and sand, fall fairly steep down to the valley; at the left the slopes rise to the high regions of the Lunkar- and Lunpo-gangri range. From the right side a few ravines open out, one of which was deep-cut and full of ice. Near Camp 375 the Buptsang-tsangpo flows straight north. The fall is very slow. The region of Camp 375 is called Monlam-kongma; Monlam-yogma is the place where I first reached the river. Both belong to the district of Bongba-kebyang.

Above Monlam-kongma the breadth of the valley remains 5 or 6 km. The road partly follows the bottom of the valley, partly the slopes on the right side, and the top of the erosion terrace. There is very little vegetation, and grass is to be seen only in the bottom of the valley, where springs and swamps form great ice sheets. No high peaks are visible south-eastwards on the Kanchung-gangri, though perhaps this may be owing to the fact that the near hills hide a distant view. At the left or west side the slopes rise direct to the high regions of the Lunkar range without any hill ridges in the foreground. Near Camp 376, where the height is 4 835 m, a side valley, Amchung, from the east, enters the Buptsang-tsangpo.

Above this place the valley slowly turns to the left, making our direction S.S.E. The height at Camp 377 is 4 883 m. giving a rise of hardly 50 m for a distance of 10 km. The view of the high peaks of Lunpo-gangri in front of us, becomes more and more fascinating. To the Kanchung side only two smaller summits are visible, one with snow on its northern side, the other, further S.E., covered all over with snow. The road keeps to the right or Kanchung side of the valley, either on the slopes or on the terrace which is 15 or 20 m high; on the Lunkar side there is also a terrace. The breadth of the valley here is about 3 km. There is no living rock along the road.

On the section to Camp 378 the road follows the top of the right side terrace, where the ground chiefly consists of soft sand. The river mostly flows in one deep channel, and where it is open there is a good deal of drifting ice.

The scenery develops the further one proceeds southwards. From the Nima-lung-la one gets the impression of the existence of only *one* high range to the south, but it soon becomes clear that the Buptsang-tsangpo is situated in a tectonic valley between *two* great ranges. The eastern range, Kanchung-gangri, gradually shows its panorama of lower peaks, partly snow-covered, and not to be compared with the high and sharp pyramidal peaks of Lunpo-gangri. Two of these summits are particularly high and are the same which were measured from the south by Wood and found to be 21 600 and 23 150 feet high.

On the way to Camp 379 the valley widens, and becomes more like a steppe with swamps and isolated branches of the river. This plain is called Bupyang-ring or "the great deep valley". Targo-ngabo is a little tributary from the Kanchung side. Above the plain the Buptsang-tsangpo is formed by three source branches, of which the westernmost comes from the Chomo-gangri, the middle one from a massive called Yalak-malak, where a deep-cut valley is seen, surrounded by snowy mountains, and the third comes from Samye-la. Between Chomo and Yalak-malak the two mighty summits Lunpo-gangri stand out far above the others. When the snow masses melt during the summer, and later on in the rainy season, the Buptsang-tsangpo grows to a very considerable river, which, as the nomads said, cannot be forded for three months.

THE LUNPO-GANGRI FROM CAMP 383.

GEN. STAB. LIT. ANST. STHLM.

THE LUNPO-GANGRI FROM CAMP 379

S 78° W S 89° W N 81° W

A PART OF THE LUNPO-GANGRI FROM CAMP 382.

S 5° E S 9° W S 24° W

A PART OF THE LUNPO-GANGRI FROM CAMP 382

VIEW OF THE SURLA AND PEDANG RANGES, FROM ABUK-LA.

THE LUNPO-GANGRI OF THE TRANSHIMALAYA AS SEEN FROM CAMP 381, BUPTÖ.

The section of the road to Camp 380 has about the same character as the previous one. To avoid swamps and watercourses now covered with and surrounded by great ice-sheets, the road has to keep to the foot of the eastern mountains, where several ravines, with or without water, come down. Only near Camp 380, 4 968 m high, does the road follow the bottom of the valley, where a watercourse is crossed with 2 or 3 cub. m a second.

On the next section the road has a strong ascent to the S.E. amongst gravel and blocks of gray granite. At Camp 381 the height is 5 370 m, on the bank of the branch of Buptsang-tsangpo which comes from Samye-la. Between Camps 380 and 381 the road crosses a secondary threshold.

Samye-la, or as some informants pronounced the name, Sangye-la, has a height of 5 527 m. From a great valley in the Kanchung-gangri, N.E. of the pass, a brook comes down which should be regarded as the source of this branch of the Buptsang-tsangpo. The highest summits of the Lunpo-gangri rise close to the west and S.W. of the pass; to the N.W. the Buptsang valley disappears in the far distance between its two ranges, and to the S.E. descends another, rather deep-cut valley; to the E.S.E. and S. E. are visible the high peaks of Kanchung-gangri and Chomo-uchong. Living rock is not found on the pass, but the detritus is all gray granite. Samye-la is a very flat pass; it even takes some time before one is sure of having reached its culmination. To the north it drains into Tarok-tso on the plateau-land, and southwards it drains into the Tsangpo. It is situated in a valley between two ranges, whereas all the four first passes are situated on the crests of ranges. It is therefore a more convenient and easy pass, especially as it is not very high and as the rise from both sides is comparatively gradual. At Camp 382 the height is 5 366 m.

One brook begins on the Samye-la, another comes from the glaciers west of the pass; both cut their courses south-eastwards through heaps of old moraines, gravel and blocks of gray granite. The road proceeds between both brooks, up and down amongst the moraines, of which some, consisting of finer material, are covered with moss. A considerable tributary comes out from the north, from Kanchung-gangri, and from the right side, Lunpo-gangri, there come several small valleys, all full of ice. At the foot of the moraines the valley widens out to a plain with grass; at its southern side the mountains consist of sandstone. Here Camp 383 is at a height of 4 945 m. Viewed from this side the high peaks of Lunpo-gangri prove to be very narrow, with steep sides to the N.E. and S.W.; in their south-eastern continuation appear several new peaks.

The brook going southeastwards from Samye-la, is a right tributary to the Chaktak-tsangpo; I heard no special name for it. Below Camp 383 its valley becomes very narrow and deep-cut; the brook now (April 17) carried $1^1/_2$ cub. m a second and had ice-sheets two feet thick along the banks. Lower down, the whole river is frozen, as being protected in the still deeper, shadowy valley. Several tributaries enter from both sides; those on the left, coming from Kanchung-gangri, are

the largest. From Camp 384, where the height is 4 832 m, the valley makes a sharp turn to the S.S.W. The living rock is here calcareous schist. From Samye-la to Camp 384 the river has followed the great latitudinal valley, which begins at Tarok-tso. But in the neighbourhood of Camp 384 this valley comes to an end, and the river pierces the southern or Lunpo-gangri range, which is much lower here than further N.W.

The often interrupted terraces are 10 to 15 m high; the road either follows their tops, or goes along the slopes or in the bottom of the valley. Rapids become more frequent; the ice disappears. In the background of two pretty large valleys from the north comparatively high mountains are to be seen. The river grows gradually and has at Camp 385 4 cub. m, after having received the great right tributary Rukchok, which seems to originate from the southern side of the Lunpo-gangri. The joint valley goes to the S.E. and becomes broader; to its right, S.W., are considerable mountains with some snow on their northern slopes. The rock is green schist. To the N. 57° W. and N. 62° W. the two highest peaks of Lunpo-gangri are still visible.

Camp 386 is at the bank of Chaktak-tsangpo, which here carried (April 19) 6 cub. m; a short distance below this camp the joint Samye-Rukchok river enters the Chaktak, which continues southwards past Pasaguk to the great Tsangpo. At Camp 386 the valley of the Chaktak-tsangpo is fairly narrow; it has a well developed terrace at its left side; to the N. 49° E. a snowy peak is visible. The solid rock is green schist. This region is a real labyrinth of mountains and deep wild valleys.

Continuing eastwards I one day got an opportunity to follow this part of the middle Chaktak-tsangpo upwards; above Camp 387 the river pierces the Kanchung-gangri, and, below Camp 386, it pierces the Lunpo-gangri, and therefore shows itself to be a very energetic river. We have found its sources to be situated on the Lapchung range at both sides of the Sangmo-bertik-la. Some nomads at Camp 387 called the river Lap-kamba and its valley Lap-lungpa and asserted that the name Chaktak-tsangpo was only used below Pasa-guk.

Above Camp 386 the Chaktak valley is broad, about 1 km, and the ascent slow; the erosion terraces are sharp cut; there are good pasture grounds in the bottom of the valley. This part of the valley is fairly straight and the river not very winding. Sometimes the river is divided into several arms. Only one considerable tributary enters from the south; from the north there are several smaller tributaries. At Camp 387 we again leave the Chaktak-tsangpo which, in its lowest part, is seen coming from the N. 10° W. The height is 4 702. The general direction is, however, N.E.—S.W., as the river comes from Lapchung-tso, which is situated to the N.E. Not far away to the N.N.E. two moderate snowy peaks are visible, said to send a considerable tributary to the Chaktak-tsangpo. A little triangular plain is formed where the two rivers meet. The main river was called

Kanchung-chu by some nomads of the place, and the tributary, which comes from the east, Gyäbuk-chu. The rock is sandy schist.

The Gyäbuk valley receives from the north or Kanchung-gangri, five tributaries with brooks, and several dry ravines. Through the openings of most of them are visible parts of the northern mountains with some snow on the crest, probably belonging to the Kanchung-gangri, unless the Nien-chen-tang-la stretches its westernmost part as far as to the neighbourhood of Chaktak-tsangpo. The northern tributaries are steep and rocky and no roads seem to go up through them. The rock is argillitic schist and sandy schist, but the gravel consists chiefly of granite, porphyry and conglomerate. At Camp 388 the height is 4 865 m.

On the next section of the road, to Camp 389, the valley of Gyäbuk-yung rises to 5 001 m; several tributaries enter from both sides; two of those from the north are considerable; the second one is called Gyägong, remembered from the fourth line of crossing, where Camp 390 is situated in it. Near its entrance the rock is sandstone.

Above Camp 389 the Gyäbuk valley is full of ice, hardly leaving a passage free at the foot of the terraces. The rise is slow up to the pass Gyäbuk-la, 5 175 m high. The view is interesting. To the S.S.E. the Chomo-uchong is again visible; to the east and S.E. is a confusion of ridges and low peaks; to the N.E. is a dominating mountain group not very far away and constituting the eastern continuation of the range we had crossed in Gyägong-la and which, as I have presumed, is the western end of Nien-chen-tang-la. At the eastern foot of Gyäbuk-la is a valley coming from N. 5° W. and directed to the S. 44° E. where it soon joins the upper part of Argäp-rong, a valley which, as we know from the third crossing, joins the Kanglung-bup-chu and goes down to the Sa-chu of Saka-dsong. Proceeding E.S.E. our road crosses several other tributaries to the Argäp-rong; the elevation is considerable, always above 5 000 m on our road. Up through one of these valleys a convenient road is said to proceed to Targo-gangri. The region is called Churu-yung. Gyäbuk-la is a water-parting between the Chaktak-tsangpo and its great tributary the Sa-chu-tsangpo. The rock is argillitic and quartzitic schist.

Camp 390 is at a height of 5 079 m; from there our road proceeds to the E.S.E. over a series of flat hills, separated from each other by valleys with brooks and ice-sheets; the rock is quartz-diabas; sometimes the Chomo-uchong appears in the S.W. The pass Kichen- or Kinchen-la has a height of 5 441 m, and is situated quite near the Kichung-la, crossed on the third line, as described above. Beyond a second threshold a valley goes down to the E.S.E., belonging to the Raga-tsangpo. From the pass the Lunpo-gangri is visible; the mountains to the N.E. are covered with fresh snow making them appear higher than they are. Eastwards one sees the plains of Raga-tasam. Camp 391 is at a height of 5 209 m in the valley going down from the pass. Our road follows this valley for a while and then turns S.S.E. over rolling hills. Camp 392 is at 5 103 m in a region called Rapak.

Our road to Camp 393, at 4 656, follows the S.E. foot of the Chomo-uchong and crosses the little threshold Kule-la, 5 088 m high, where the living rock consists of quartz. Here one enters the *tasam*. The pass is so far important as it is a water-parting between the Raga-tsangpo and a little direct tributary to the Tsangpo; on the southern side its slope goes steep down to that valley. It is joined by a great tributary from the N.W., in the background of which a part of the Chomo-uchong is to be seen. At Semoku, which is a station on the *tasam*, the height is 4 596 m. From here the *tasam* continues to the west through the broad valley of Sa-chu-tsangpo and Saka-dsong. Our road has a more northerly course to the village of Ushü, where the fifth crossing comes to an end.

The climate of April was anything but settled. The mornings could be fine and clear, but at noon heavy clouds would appear, accompanied by hard wind from S.W. or west. On April 3 there was snow-fall and hail both at Chunit-tso and on the Nima-lung-la, and on April 5 the whole northern side of Lunpo-gangri was whitened with freshly fallen snow. About April 20 there were frequent snow-falls, especially round Gyäbuk-la. In the beginning of April the Buptsang-tsangpo was still covered with thick ice, though there was always an open channel, and a little spring flood from melting river-ice was just about to set in. The weather was often stormy and the prevailing wind S.W., though it varied very much in different valleys. During several days one could observe that an almost stationary cloud hung over the Kanchung mountains, while the snow-covered summits of Lunpo-gangri remained perfectly clear.

Animal life was represented by the usual specimens. Round Chunit-tso there were kyangs and goa-antelopes, drinking from the fresh-water springs on the shore. Wild geese were numerous. Kyangs also appeared in the broad Buptsang-valley, and along the banks wild geese, ducks and gulls were often seen. Hares and foxes were seen on the Samye-la. In the mountains north of Gyäbuk-la the wild yak is said to live.

Nomads are rare as before. At Chunit-tso only one or two tents were seen in a valley, as well as a salt-caravan. South of Nima-lung-la one tent was pitched, and at Camp 373 another. A few shepherds were seen with sheep and yaks. At Camp 374 a party of travelling nomads were met, coming from Tradum and going to Gertse. Near Camp 375 we reached 13 tents belonging to poor nomads, possessing 30 or 40 sheep each, or, at the most, 100. Up to Amchung we saw 6 tents along the Buptsang-tsangpo, most of them at the left side of the valley and in the mouths of tributaries. Many pasture grounds were now empty, as the nomads had gone in search of better grass further north. The section between Camps 378 and 379 especially was said to be well inhabited during the summer. Near Camp 379 there were now only 5 tents with flocks of sheep and yaks. On the road to Camp 380 2 tents were passed and near that camp 4 tents were pitched. A great salt-caravan of 350 yaks was seen crossing the Samye-la on its way to Pasa-guk, where a salt-market is held in summer. On both sides of the Samye-la there were many signs

of old camps, probably rather from caravans than from nomads. About Camp 385 several travelling parties were seen, and at Camp 387, 4 tents. In the Gyäbuk valley and its tributaries 10 tents were pitched, and on the western plains of Raga-tasam 5 tents. At Semoku were 10 tents and one stone hut.

Some nomads at Chunit-tso pointed to the east, where the country appeared to be comparatively low and easy, saying this was the nearest and most convenient way to Lhasa. As I was to find out later on, the road to Teri-nam-tso is in fact convenient; farther eastwards it proceeds to Penla-buk, Shansa-dsong, Guring-la and Lhasa. The natives of Monlam-kongma asserted that no other road existed to Tradum, Saka and Raga, except that over Samye-la, information which seemed to indicate that the height of the Lunkar-Lunpo range must be considerable in this region. Southwards from Samye-la the road, therefore, was said to divide into three branches: 1) to Tradum 7 days; 2) to Saka 8 days, and 3) to Raga 6 days. North-westwards these nomads knew of only three important roads, namely, to Gertse, Senkor and Semnit. The nomads of Bupyung-ring also asserted that from there no direct road to Tradum went over the Lunpo-gangri. Later on we found out that from the valley of the lower Buptsang-tsangpo several roads cross the Lunkar range. The chief road to Tabie-tsaka crosses the Samye-la.

The district round Camp 351 is called Kemar, Bongba-kemar or Kemar-denang. The country south of Dung-la belongs to Bongba-kebyang.

CHAPTER XXXIV.

THE SIXTH CROSSING.

The fifth line of crossing gives us an excellent proof of the fact that the ranges in this part of the Central Transhimalaya run from N.W. to S.E. parallel to the course of the Buptsang-tsangpo and forming an angle of about 45° with the great Tsangpo. But west of the fifth crossing follows a region which, in its interior, remains completely unknown. Here therefore the geography must be conjectural. From my sixth crossing, between Nganglaring-tso and Tokchen I got the impression that the direction of the ranges is here almost the same as that of the Lunkar and Lunpo-gangri. It is therefore allowed to be presumed that all the ranges between my fifth and sixth crossings run N.W.—S.E. I gathered some information about these ranges on my journey from Teri-nam-tso to Nganglaring-tso along the northern foot of the system, to which I shall have to return in a special chapter.

To give an idea of the sort of information one gets from the *tasam*, the way used by Nain Sing and Ryder, I shall here insert the following reports. At Targyaling I met a very large caravan of yaks loaded with salt, and coming from the north. The leaders told me they came direct from a salt lake Tabie-tsaka, some 25 or 30 days north; on the road they had crossed a pass, Kure-la, 12 days from Targyaling. From their description it was hopeless to get an idea of what the country to the north was like. As they asserted that only one pass existed on the road, one would imagine that only one range was situated to the north.

An old Tibetan in Pasa-guk had been many times to a salt lake, Umgang-tso, situated to the N.W., 35 days' journey for sheep. He remembered the road in detail, and used to pass the night at the following places, beginning from Pasa-guk: Tegung, Kyang-tsaka, Pempo-lung, Chugar, Tsira or Gyamnak, Kosang, Longma, Dumbö-tugna, Rongser, Longdem, Ri-tari, Rachung-jamri, Tasang, Tasang-lukang, Näk-kyam, Taglak, Hakpo, Ri-tari (N:o 2), Chu-sumbuk, Changbuk, Chusän-langdo, Ting-gung, Sabsang, Tingmig, Uri-songa, Yo-or, Saser, Tsung-gung, Chiten, Yor-chung, Longa-karmo, Tukto, Tser-tso, Langma, and Umgang-tso. — There were many low passes to cross. On the first day the Chaktak-tsangpo is left behind. The second day from Pasa-guk he crossed a pass called Changdung-la. Between Rachung and Tasang was a high pass, Kanchung-tsa-la, which, however, was avoided by

the road; it was a water-parting between the Chaktak-tsangpo and Men-chu. Yo-or-la was the highest pass on this road, and the last place from where water went to the great Martsang-tsangpo. To the north or N.E. from this pass flows a river, Sergo-tsangpo, and there was another river called Chu-sumbuk; in the list of names this river, however, is mentioned as situated south of Yo-or-la. The length of every-one of the 35 stages was said to be as long as the distance from Saka-dsong to Pasa-guk, which indeed, would be sufficient to take us through the whole of Tibet and Eastern Turkestan to Kashgar!

At Pasa-guk another man told me that north of Raga-tasam was a pass, Chapsang-la, forming the water-parting between Chaktak-tsangpo and Raga-tsangpo, which should indicate the existence of only *one* range in this region, if the information of the Tibetans were in the least reliable.

From Chärok, my Camp 195, a valley, Hlalung, was shown to the N.E. in the Transhimalaya. Up this valley a road was said to proceed north-eastward to Tabie-tsaka, a road that should be just in the middle between my 5th and 6th crossings. It was therefore of particular interest and I did my best to get it explained to me. The road was said to take 13 days, each about 14 km long; two or three longer stages are sometimes divided, making 15 or 16 days in all. The following places are passed: Hlalung-do with Hlalung-la, Pangkildum, Men-la-tütang or Men-li-la, an easy pass, to which a valley gradually ascends, Burkar, Ngurva, Pem-tang, Toragruk, Romar with the low threshold Romar-la, Amdo-dejung, Chungbap, Nargü, after which one has to cross Gangni-la, a low sandy pass, Gangni-larguk, and Tabie-tsaka. The Men-la I saw from the north. Gangri-la is said to be situated in a range between Tabie-tsaka and Tarok-tso, in which there is, further west, another pass, Koke-la. Romar-la was a water-parting between Tarok-tso and Chung-kor, a river also called Sa-chu-tsangpo. Thus a few names on this itinerary can be easily identified, though it would be impossible to get a general conception of the hydrography and orography from it.

Nganglaring-tso is at a height of 4 748 m; Tokchen at 4 654 m; the water-parting pass, Surnge-la, at 5 276 m; the rise from Nganglaring-tso to Surnge-la is therefore 528 m in a distance of 127,2 km, in a straight line, and 160,6 km along our road. The fall from Surnge-la to Tokchen is 622 m in a distance of 30,3 km in a straight line, and 42,4 km along the road. Taking Ding-la, 5 885 m which is halfway between the two end points, we get a difference of altitude between this pass and Nganglaring-tso of 1 137 m; between Ding-la and Tokchen the difference is 1 231 m.

The time of year of this journey was July, 1908.

One of the greatest plains at the northern foot of Transhimalaya is that which extends itself on the southern shore of the Nganglaring-tso. Here the river Sumdang-tsangpo enters the lake. At my Camp 439 the river has a very slow current and the bed is regular; the surrounding plain, covered with grass, rises only 2 or 3 feet above the water; the volume was $2^1/_2$ cub. m, June 27th. Selipuk is situated on

the left bank of the same river. At its right side are several swamps with good grass. The soil consists of fine gray and yellowish clay, and is very level, having formerly been a part of the lake-bed. To the north a ridge of hills extends to the shore of Nganglaring-tso, and on one of their lowest slopes near the river is the monastery of Selipuk. The pass Sige-la is pointed out to the N.W. with a road to Yumba-matsen, three days long, passing Ting-chung-tok, Tok-karmar and Palchen-tso. Another road to Yumba-matsen crosses the Yülo-la; over Dsoji-la a third road leads to the same district. A high mountain to the S. 41° W. is called Lavar-gangri, though by some informants this name is attributed to the whole mountainous region S.W. and S.S.W. To the S. 48° E. there is said to be a secondary pass, Oyar-la, with a road to the valley of Pedang-tsangpo taking four days. The pass Gäbyi-la is said to be situated S. 20° E. with its road to the region of Maryum-la. Straight south is Sumdang-la, from which a branch of the Sumdang-tsangpo seems to derive its origin. To the S. 10° E. two passes are said to exist: Jaoshe-la and Ner-la with a seven days' road to Shamsang. South-westwards is a Changma-yubga-la with a road joining the one over Surnge-la to Tokchen.

The road to Rartse goes over the plain with abundant tussock grass, and a soil which becomes very swampy after rain. From this place, Camp 441, the source of the Sumdang-tsangpo is shown to the S. 21° E., and is said to be three days distant. From Rartse the plain continues to the foot of the hills, but its southern part is perfectly arid and consists of fine gravel. On account of its level character there are no signs of old beach-lines on the plain, but along the foot of the hills they become so much the sharper marked. First it is a series of flat undulations, then three greater rounded walls, the one in the middle being 7 m high, and, finally, another series of smaller undulations rising gradually to a kind of terrace which is at the same level as the highest beach-lines. The aneroids here gave 4 874 m; though the height from one reading cannot be reliable, the lake should have been some 126 m higher at an earlier, pluvial period, which agrees with the beach-lines I found at Lakor-tso, which were 133 m high above that lake.

The first hills are crossed in a little pass called Chase-la, 4 953 m high, and situated in porphyry rocks. The valley on its southern side is formed by the two valleys of Kyangyang and Kartsak, from S.W. and S.E. At Kyangyang, Camp 442, the height is 4 977 m, and the rock porphyry.

The Kyangyang valley rises slowly to the double pass Kyangyang-la with a height of 5 157 m. To the S. 23° E. is the district Sumdan-changma; S. 10° E. is Pang-nagrong; S. 5° E. is Molung, a valley with a road to Molung-la and Tokchen, now reported to be impossible for traffic on account of there being more ice and snow than usual. This Molung-la must be situated in the same range as the Ding-la; and as the Ding-la was one of the most difficult passes in the whole system, the Molung-la is probably very inconvenient, though not belonging to the continental water-parting. To the S. 1° E. is the valley Gangchen, and S. 42° W. Gangchung;

through the latter is a road to the S.W. passing a little lake, Tsi-nguri-tso. To the S. 60° W. is Lavar-naglep, a great valley to which all the source branches of the Lavar-tsangpo run down. From Kyangyang-la the road descends in sand to Lavar-demar on the Lavar-tsangpo and at a height of 5 048 m.

The road to Camp 444, at 4 949 m, follows the Lavar-tsangpo, which carried about 1 cub. m, thus being much smaller than the Sumdang-tsangpo. A little red mountain to the north, belonging to the range of Kyangyang-la, is called Tsa-mogri, indicating the existence of rock salt. Targo-tsiri is a valley from the left or south with a brook of 1/2 cub. m of water per second, coming from the snowy mountains in its upper part; such mountains are also seen in the upper part of Targo-nakta. Higher up, east of Camp 443 is a tributary to the Lavar-tsangpo, called Chiri-marmo. Two small hills on the northern side of the valley are called Cham-ngota and Dung-ri. From the left or south enters the brook of Chu-sän, coming, as the name shows, from a hot spring. The valley of Lavar-tsangpo is very broad and open; its soil is partly grass-covered, partly gravel.

In order to reach Ding-la the road slowly diverges from the Lavar-tsangpo, going straight west and crossing the vegetation belt along the river and the left side erosion terrace; then it gradually ascends the scree of gravel at the northern foot of the Ding-la range. Several small transverse valleys run down to the Lavar-tsangpo. Higher up there are several old moraines of gravel and blocks of gray granite. Tugyen-gerko is one of the transverse valleys; opposite it, at the northern side of the Lavar-tsangpo, is a tributary called Lungmar. From the next southern tributary, Ganglung-ringmo, comes a brook. Tsalung is the next. In the background of all these small valleys, snowy heights are visible belonging to the crest of the Ding-la range. From the slope west of Tsalung we notice the very broad and level valley of the Lavar-tsangpo stretching far to the north. To the N. 80° W. are a couple of small peaks belonging to a range situated between the Lavar-tsangpo and Aong-tsangpo; N. 60° W. is a left tributary called Raa-taong; to the N.W. is the valley Lungnak and south of it a light low mountain called Su-kamruk; N. 23° W. is a place called Tokchung; to the N.N.W. is the junction of the valleys of Aong-tsangpo and Lavar-tsangpo, and in the same direction Tok-marpo and Aong-dunker; to the N. 5° W. is seen a little salt lake, Damrap-tso, which must be close west of Lavar-tsangpo. The plain itself has the name Tsabsang-tanga; N. 8° E. is a low peak with some snow, and near it the valley Shaglung; N. 18° E. Pago-la; N. 23° E. the valley Lungchen, and N. 33° E. the valley Yülo, both right tributaries of the Lavar-tsangpo.

After having crossed another two or three deep-cut ravines, the road enters the more considerable valley from Ding-la, where Camp 445 has a height of 5 196 m. From here the direction of the road becomes straight south. The valley is deep and narrow, and the road has to climb the left side slopes, covered with gravel. The crest rising at the right side of the valley has some patches of eternal snow.

The pass is called Ding-la or Chargo-ding-la, and its height is 5 885 m. To the north the view is hidden by mountains close at hand. To the S.E., S. and S.W. is the not very high water-parting range of Surnge, with eternal snow on some of its peaks. Between the Ding-la and Surnge ranges the country is a confusion of hills and ridges. Comparatively near, to the S.E., is a group with eternal snow and small glaciers; S. 31° E. is the valley Shiri-marmo; S. 25° E. is the valley Tsomra; S. 22° E. a snowy peak; S. 15° E. the ice-filled valley of Da-teri; direct south is the small lake of Argok-tso, and south of it opens a valley called Dar-kyang; west of the lake is the valley Tsalung, and in our vicinity, S. 20° W., a place called Dobo-martsong.

Ding-la lies in granitic porphyry; a little rock in the valley south of the pass consists of diabas-porphyrite; the descent is steep; from the left enter several tributaries, the greatest of which is Longgyo; they are all right tributaries to the Aong-tsangpo. To the S.W. appears a small snowy peak. Luma-nakpo, Camp 446, is at 5 138 m.

Just south of this camp the river Argok-tsangpo flows to the N. 24° W. It had (July 9th) 5 cub. m of water and receives a tributary of $2^1/_2$ cub. m from considerable snowfields and small glaciers on the S.W. side of the Ding-la range. The deep and narrow valley in which it pierces this range is visible to the N.N.W. It seems curious that the road does not follow that valley instead of forcing the high Ding-la pass, but either the valley makes too long a detour to the west, or it is impracticable for traffic.

The country between my sixth and seventh crossings is unknown, and I could not get any reliable information regarding the source of the Aong-tsangpo, the river which joins the Lavar-tsangpo. Some informants affirmed that the Argok-tsangpo joined the Aong-tsangpo at Aong-dunker, others that the Argok-tsangpo was the same river which lower down was called Aong, after having received some more tributaries. However, the Argok-tsangpo comes from the Argok-tso, a little lake which was left to the S.E. of our route, into which several tributaries seem to flow from surrounding mountains. The lake is surrounded by hills; at the left side of the river is a terrace 5 m high. From the west a little river, Surnge-chu, enters the lake; on its bank, Camp 447 has a height of 5 155 m; the fresh-water lake Argok-tso thus still belongs to the hydrographical system of Nganglaring-tso.

The Surnge valley is broad and flat, between rounded hills covered with snow even in the middle of summer; the rise of the valley is very gradual and the river forms, as it were, a series of small lakes; from the sides enter several small brooks; at one place the valley is divided by a hill. From the N.W. enters a tributary, Takche, at the lower course of which Camp 448 has a height of 5 281m. The rock here is granitic porphyry, and the same rock prevails on the pass. This water-parting between the Satlej and the plateau-land is very extraordinary. Proceeding south-westwards from Takche one has the impression of going through a great open

valley between moderately high mountains; to the eye its bottom is perfectly level; to the left there is a pool, but no sign of watercourses or terraces. Only where a very little brook, flowing to the S.W., is seen, one understands that the extremely flat threshold has been crossed; a little above this point the height is 5 276 m, 5 m less than Takche, which was, however, a little farther up on the course of the Takche brook. The Tibetans call this threshold Surnge-lungpa and sometimes Surnge-la; I have preferred the latter appellation as showing that this is really a first-class water-parting pass.

Proceeding south-westwards the fall becomes steeper and the valley more and more developed. From the left enter the tributaries Donglung and Dajo-lungpa, from the right Panglung. Already at Camp 449 the height is only 4 917 m, giving a fall of 359 m from the threshold of Surnge. This is the most convenient passage from the peripheric land to the Tibetan plateau-land I have seen; but further inland one has to cross the high and difficult Ding-la, which comes like a revenge for the easy crossing of Surnge-la.

From Camp 449 a low peak, Gurla, with fresh snow, is seen to the N. 88° W., and to the S. 78° W. is Pundi-ri on the north side of Manasarovar. To the S.W. is seen the upper part of the valley Pachen; at the point where our road leaves it, it is broad and open, but soon becomes very narrow. The road goes southwards, crossing small tributaries to the Pachen and a little rock of granitic porphyry, after which it ascends to the pass Yübgo-la 5 242 m. On its southern side, where the rock is petrosilex, the road enters a narrow valley. To the west is seen a pyramidal peak, not very high, said to be called Poje-gurla; to the S.E. is the little peak Yültsa-chügmo. The valley itself is called Gelle-lungpa, where Camp 450 has a height of 5 027 m.

Lower down the valley opens up a little; the rock is petrosilex and gray-wacke. To the left is a peak Dongitse, from which a tributary comes joining the Gelle-lungpa; the joint river is then called Tolege-buk and flows south-westwards to the Samo-tsangpo. The road crosses a little threshold, Rigong-la, 4 972 m high, and then continues over rolling hills down to upper Tokchen, where the height is only 4 654 m.

After fine weather in June, the rainy season set in in the beginning of July, with sometimes rather heavy rain. July 9th hail and heavy snowfall occurred round Argok-tso, and in the Surnge valley the snow lay half a foot deep. Rainy days then become more and more frequent at Tokchen and down the upper Satlej.

Animal life was the same as usual. The open plains of Selipuk may be regarded as particularly rich in animals, kyangs, goa- and pantholops antelopes, hares and wolves. Along the Sumdang-tsangpo wild geese, ducks and gulls were numerous.

Nomads are more numerous on this line than on the previous one. Near Selipuk-gompa only 3 tents were seen and 3 at Rartse, but 60 tents in all are said to have to provide the lamas of the monastery with water and fuel and to take care

of their flocks. In the Kartsak valley 1 tent was seen and in Kyangyang 5 tents, though several others were hidden in neighbouring valleys. At Lavar-demar some 12 tents were pitched. The nomads round Camp 444 at Lavar-tsangpo were said to go to Yumba-matsen in summer. No fewer than 150 tents were said to belong to the district of Rundor. At Takche were pitched 26 tents: about 20 tents in a valley below Camp 449 were just breaking up. At upper Tokchen we counted 16 tents.

From Selipuk there is a road of 3 days' lenght over the Sige-la to Yumba-matsen, from where another 3 days lead to Gerke; farther east this road continues to a hot spring called Chu-tuá, and finally, as far as informant knew, to a place called Chumik-ba.

As usual it is difficult to get information from the nomads concerning the administrative boundaries. Camp 439, on the Sumdang-tsangpo, is in Rundor-changma, and Camp 444 on the Lavar-tsangpo is still in Rundor, but the nomads of this district are said to pay pasture-tribute to Yumba-matsen. South of Ding-la is the district Hor-pangri, south of which follow Hor-paryang and Hor.

Looking S 11° E from Khaleb.

CHAPTER XXXV.

THE SEVENTH CROSSING.

This line starts from Khaleb, N.W. of Parka, and proceeds north-eastwards to Camp 241 belonging to the district of Yumba-matsen. Khaleb is at a height of 4 629 m, and Camp 241 at 4 802 m; the water-parting pass, Lamo-latse-la, has 5 426 m. The difference in height between Camp 241 and this pass is therefore 624 m, in a distance of 68,1 km, in a straight line, and 75,7 km along the road. The difference in height between Khaleb and the pass is 797 m, in a distance of 71,2 km in a straight line, and 90,9 km along the road.

The season of this journey was September 1907.

In Volume II, p. 211—214, I have already described the first part of this road, from Khaleb to Lamo-latse-la, in connection with the source of the Indus, and continue therefore now from the pass. The intermediate space between the sixth and seventh crossings being unknown, it is not easy to say in what relation the range of Lamo-latse-la stands to the ranges, crossed between Nganglaring-tso and Tokchen. But remembering the N.W.—S.E. direction of almost all the ranges in this part of the system, it seems likely that the Lamo-latse-la and the Surnge-la are situated in one and the same range, which is the continental water-parting. From this point of view the Lamo-latse-la is more important than the Tseti-la, though the latter is 200 m higher. We have to regard the upper Indus as running between two fairly parallel ranges; the one on its right bank is the Surnge range with the sources of Lamo-chu, Bokar-tsangpo, and Munjam-tsangpo on the Indus side, and the sources of the Aong-tsangpo on the Nganglaring-tso side. The range on the left side of the Indus gives the sources of the Lungdep-chu and Tseti-chu, and continues north-westwards.

From Lamo-latse-la the view reaches very far to the N.E., even to the mountains round Yumba-matsen. The brook going north-eastwards from the pass is called Lamo-latse-lungpe-do; it receives several tributaries from both sides. At Camp 237, under a rock called Tsura-marchan, the height is 5 176 m. Here enters from the N.W. the tributary Sokchung-chu, coming from Sokchung-la, and obviously situated in the same range as Lamo-latse-la. From Camp 237 two days' march is reckoned to the Aong-tsangpo, and no high mountains seem to separate us from its valley. Quartz-porphyry and porphyrite prevail in this region.

The next section of the road follows the Lamo valley to the N.E. Lung-maru is a dominating peak to the S.E. The brook is frozen, and partly hidden in the gravel of its bed. The fall is very gradual. So-nakya is the name of the mountains to the left. From the right, or S.S.E., enters a considerable tributary, Ta-tau-chu; up this valley is a road, crossing the Karyürke-la, and going over the source of the Bokar-tsangpo; it is used by salt caravans, which, further south, pass by a very small lake Kombo-rong-tso, and *viâ* Jume-la reach Parka. The two passes on this itinerary agree with the two above-mentioned ranges which, farther N.W., follow the course of the Indus.

Upa-tä is the next tributary from the right. Shevo is a mountain at a great distance N.N.E.; in the same direction is a place called Gepa-dumbo-do. The valley opens into a plain, and the fall is very gradual; from the left comes a double valley, Nyomchen-Nyomchung. The road diverges more and more from the river, which is called Tuse-chu; it is said to continue to Tusa-namgo and Shong-pele, and disappears on an extensive plain to the N.N.W.; Tusa-namgo is a red flat hill to the N. 19° W. Finally the road crosses a little ridge rising abruptly from the plain; its pass is called Dam-tärngo-la; the same name is given to the plain east of this ridge, where there is some grass and a spring at 4 991 m. The rock is porphyrite the whole way. Between Tuse-chu and the upper Indus, or Singi-kamba, there is a range called Kung-tülvö, which must be the N.W. continuation of the Surnge-range.

From Camp 238 the road goes up to a little threshold, Dam-karchen-la, 5 099 m, in limestone and porphyry; to the N.W. is seen, beyond the valley from the pass, the course of Tuse-chu at considerable distance. The country is extremely arid and weathered, detritus and fine gravel is very common, living rock ordinary, the mountains are irregular and interrupted, like islands on the wide plain; continuous ranges are not to be seen; the landscape appears in lively colours, red, yellow, violet, rose; there are nowhere any high snowy mountains, everything is comparatively low; there are no inhabitants, no animals, occasionally some scanty grass. This part of Tibet is very unlike the real Chang-tang far to the N.E. and east, with its rounded ranges and its rare living rock, its great latitudinal valleys with grass and animal life.

To the N. 86° W. are shown the mountains of Kung-hlashi, beyond which is the Singi-tsangpo, to the S. 85° W. is Ngomo-chandi. The country is very undulating. After another small threshold the road ascends the Tsalam-ngopta-la, in basalt, and 5 078 m high; this pass may be situated in the N.W. continuation of the Ding-la range. From the pass the same hopeless country is seen stretching to all sides, flat, arid, desolate; N. 18° E. is the little lake Mugu-tilep-tso, and farther, in the same direction, the mountains with the pass Nomra-la with a road to Tansam-tsaka. From the Tsalam-ngopta-la a brook goes northwards, but the road continues N.E.; to the east are rolling hills, but in the background some higher dark mountains

are visible with stretches of snow. The ground is full of gravel, the living rock is lava.

At Camp 239, Gyamboche, the height is 4 804 m. On the next section of the road the country is very flat, with small undulations here and there. The valleys are broad, with a fall hardly noticeable to the eye. The hills are either rounded, full of detritus, or rocky and sharp, but always very advanced in decay. All the mountains are low and flat, only Jau-taka to the N.E. is a more dominant height; the rock consists of lava. As a rule the ground falls to the west where a great plain extends. A little depression is called Jambu-tumba-ka with a pool with many *mani* walls. The ground is hard yellow clay with fine gravel; the height is only 4 620 m. Nothing is seen but hopeless aridity, and desolate rocks and hills in all possible colours.

Mugum-gomkor is a salt pool. At the foot of a little ridge of hills with fresh water-springs there is some grass. To the N.W. is one of the roads to Tok-jalung beyond a mountain, Yeran-tombo. At Camp 240 the height is 4 624 m; the rock south of the camp is phyllitic schist. The place is situated at the southern shore of a little brackish lake, Mugu-nirma-gyam or simply Nirma-gyam-tso; immediately west of it is a somewhat bigger lake, Mugu-tanä-tso, or, as other informants called it, Nyanda-nakpo-tso, both very shallow. The mountains to the N.N.E. are called Mugu-margyam; to the north there is said to be a pass, Nomra-la, with Gegi-gompa beyond it.

The Mugu lakes are situated in an extremely flat depression like an extensive plain; they are surrounded with grass and some fresh springs. Outside of the grass belt the soil is arid as usual. From the south enters the valley Gyekung-hloma, from the N. 80° E. Gyekung-sherma, to which our road leads. This valley is bounded by limestone rocks; there is a little brook; the rise is gradual; Camp 241, or Gyekung, is at 4 802 m. North of this place is a pass called Gyekung-la, and to the east, very near, is Nima-lungchen-la, east of which is the district Yumba-matsen with a chief residing at Tavän or Tavä-nanak. From the eastern side of Nima-lungchen the water is said to flow to a little salt lake, Gomo-tso, three days away.

The *Gova* of Yumba-matsen is said to be chief of 45 tents. The seventh crossing of the Transhimalaya goes through a very thinly populated country. Leaving Diri-pu-gompa and the pilgrims' road around Kailas, one very seldom sees even travellers. But there are often *mani*-walls, sheep-folds and camping grounds, the latter mostly used by traders and pilgrims.

The animal life was represented by numerous kyangs round the small lakes. Wild geese were common on and near the lakes. Sometimes partridges and ravens were seen. At Tseti-la appeared the Arctomys. At the source of the Indus and round Lamo-latse-la we saw herds of Ovis Ammon. Once the track of a wild yak was seen.

The weather was always clear. Hard wind from the S.W. very common. On September 15th the Mugu lakes were covered with thin ice breaking up before noon. Snow is said to fall in the middle of December; at the Mugu lakes there may occasionally fall one foot of snow.

At Singi-buk some natives gave me the information that through a left tributary to the Le-lungpa a road goes up to the pass Le-la, which seems to be equivalent to Tseti-lachen-la and be a first class water-parting. Through the Dunglung valley there is also said to be a road to Dunglung-la, west of Tseti-la, and passing a little lake, Tug-tso; I could not gather any reliable information about this lake; but it must be on the northern side of the water-parting, for a brook, Tsopta, issues from the lake, passes a place called Tsatung-ga, and joins the Indus one day's journey below Singi-buk. The little lake was said to be one day's march in circumference, and as having a rocky island in its centre; it freezes towards the latter half of November. Between Dunglung-la and Tseti-lachen-la is a third pass, Tseti-lachung-la.

A guide from Gertse gave the following names on the road to that district, from Yumba-matsen; Taben-lungsor-la, from where a brook, Pagmo-chu begins; Tseptu-marmu-la with a brook callad Savo-lärgen, going to a little salt lake called Ombo-tongchung; Orok-la, a high pass, with a brook to the little Tarap-tso, Goa-chumik; Ngomang, a plain; Hotu, a plain; Ngongtsong, a brook joining the Lerung-chu, and going to the lake Ngongtson-tso; and, finally, the plain of Gertse.

There are several other roads in this region. One is said to proceed to the N.E. to a salt lake called Tansam-tsaka, in the neighbourhood of which is a temple, Geji-gompa, with 10 lamas. From Camp 238 there is a road to Tusa-namgo, Tashi-to-uche, Kong-hlashi-la, the Indus and the camp of the *Pun* or chief of Singtod-Singmet. From Camp 241, Gyekung, a distance of four days is calculated to Selipuk; there are two different roads: the left one goes *viâ* Luma-karu, not far from a little freshwater lake, Tagar-tso; Dunker, where the river Aong-tsangpo is reached; Senge with some pools, and an easy pass, Senge-la, probably the same which was called Sige-la in Selipuk; and, finally, Selipuk, reached the fourth day. On this way, therefore, two passes are crossed, first the Nima-lungchen, just above Camp 241, and then Senge or Sige-la. There is also a third threshold, Tok-marpo. If only N.W.—S.E. ranges prevailed here, the passes ought to be mere thresholds in latitudinal valleys; but Nima-lungchen is situated in a real crest, proving that there are ranges in other directions as well. On the road from Singi-kabab to Gyekung we have also found that the orography is extremely irregular, and the mountains small and sporadic on the high plateau-land. The second road to Selipuk, S.W. of the first, crosses a pass Tartolung-la, and then touches Gyaserma, Aong-tsangpo and Tselungma before reaching Selipuk the fifth day.

Camp 235 was said to be in the district of Bomba-Singtod-lungpo. At Camp 241, close to Yumba-matsen, a native correctly pointed to the N.E. to show where

Gerke and Gertse were situated, and to the N.W. for Tok-jalung. To the S.E. he pointed out Rundor, and to the S.W. Bomba-Singtod-Singmet. Shachen-Shachung, a district on the Indus, on the road to Gartok, is the place where the *Bomba pun* or simply *Pun* of Singtod-Singmet resides. Senkor, which is under the administration of *Devashung*, is also to the N.E. Yumba and Geji are under Gartok. To the north the district of Yumba borders on Rudok.

CHAPTER XXXVI.

THE EIGHTH CROSSING.

The last of my eight lines across the Transhimalaya starts from Gyekung, Camp 241, at 4 802 m, and proceeds nearly westwards to Gartok, at 4 467 m. On this line the highest pass is Jukti-la, 5 825 m. The difference in height between Gyekung and this pass is 1 023 m on a distance of 160,6 km in a straight line, or 186,6 km along the road; the difference in height between Gartok and the pass is 1 358 m in a distance of 25,7 km in a straight line, and 30,3 km along the road, but the continental, or Indian, water-parting is situated on the Bokar-la, 5 178 m high.

The road from Gyekung to Gartok goes down the Gyekung valley and follows the southern shores of the two small lakes Nirma-gyam-tso and Nyanda-nakpo-tso. The whole plain on which these lakes are situated and which continues some distance further west, is called Mugu-telep. The greatest part of the plain is arid and inpregnated with salt, and clouds of white salt dust are whirled up by the wind; only round the lakes and at a spring, Govu, is there good grass. From Govu the following names were given: to the N. 81° E., at two or three days' distance, a fairly high mountain, Chamar-ri; to the east a mount Beylung; to the S.E. the mountains Gomolo and Ya-ngolum; to the S.S.E. Tardolung; to the S.S.W. Ya-rakpa; to the S. 62° W., not far away, a dark rock Takgiya; to the N.W. Nyanda-nakpo; to the N. 19° E. Ti-ralpa; to the N.E. Donggu; in the same direction, but at great distance is mount Tama-shipcha, and to the N. 59° E. mount Tava-kale.

Farther west on our road are two more salt pools, the largest called Tso-longcho. A little ridge of hills is crossed in a pass called Sigu-ragling-la, and N.W. of it the ground is almost perfectly level, the undulations, at any rate, not noticeable to the eye. On both sides are low detached hills; the country is like a desert, the ground consists of yellow clay covered with fine gravel. There are also two small lakes to the right, Tso-kar and Pul-tso; to the N.E. it is said to be two or three days' journey to Gerke. The country becomes more and more open, it is an endless plain, one of the greatest I have seen in western Tibet; grass is rare.

At the fresh springs of Luma-rigmo the height is 4 614 m; near it is a rather large saltwater pool. A little detached peak to the S. 13° W. is called Nyuri; to the S.W. is a low ridge Dongchen; to the S. 60° W. the valley Changmo-lung with

Tibetans near Gartok.

its hills; Ri-maru is a mountain not far off to the S. 81° W.; Depto-nakpo is a dark mountain to the W.N.W. Far to the N.W. is a mountain Tota, beyond which is Tok-jalung, at a distance of three days; Nargü-rigmo is a valley to the N. 53° W.; near Camp 243 to the N.N.W. is a low mountain, Talung-tebötö; Takung is a mountain to the N.N.E.; to the N.E. are the comparatively high, pink-coloured, bulky mountains Toymo; Tagsang-karpo is a flat, brown mountain S.S.E. and Ri-mugir some of the hills along the road from Camp 242. The rock is lava.

On the next section of the road, to Camp 244, we approach the range which is situated on the right side of the upper Singi-kamba, which is crossed in the Bokar-la. Though the country is extremely level to the eye, the ground rises gradually to the west, from 4 614 to 4 700, 4 766 and 5 021 m. The hills and rocks are small, strongly weathered and isolated on the plain like islands in a sea. One such rock touched by the road, consisted of porphyrite, another of volcanic tuff; the ground is hard, the gravel glassy lava, all more or less windworn. Ri-maryul are some hills surrounding a little valley to the south, Nguyuma and Takdong are the mountains to the north, Chang-molung is the plain itself. Beyond a little threshold is the valley Nasecho with an open spring. Looking eastwards from the threshold one has a very extensive view over the plain, an extremely flat depression, a highland desert, low, flat, levelled, windworn, weathered and disintegrating rocks, a country swept clear by innumerable storms, a dry, arid and desolate country. At Sariyul there is another spring and some grass.

From this place the road gradually rises towards the first class water-parting pass Bokar- or Bukar-la, 5 178 m high, from the western side of which the drainage goes to the Indus. Some peaks are visible: to the S. 63° E. is the rocky mount Kung-tilbu; to the S. 5° W. is, in our neighbourhood, the peak Yula-naktso; to the S.W. is Marbu-kabra, a low flat ridge; to the S. 63° W. is a dominating nameless peak, and east of it a place often mentioned, Sambuk-sumdo, where several roads meet. To the S. 80° W. the district Bomba-Singmet is shown; to the W.S.W. extends the immense and desolate plain which is bordered by distant hills.

The country is as desolate as ever, and there is hardly any sign of life. Snowy mountains are not within sight; only one peak to the S.S.W. has a little snow-patch. To the S.S.W. the country is open, but to the south are some mountains, of which one is called Shungu. Having crossed the plain and a low threshold, the road enters a valley. There is a spring Pulduk-kar and a watercourse, Kung, with comparatively high mountains in the background. From several other springs the water forms a little brook, the valley becomes more and more narrow and sharply marked and there is some grass. The right side erosion terrace is 6 m high; the left side terrace is more interrupted; these well developed terraces remain as proofs of a precipitation of which now very little is left. The valley joins the Indus at Sambuk-sumdo at 4 698 m. The rock on this section is porphyrite and quartz-porphyrite.

The valley of the Indus downwards has a moderate breadth; the mountains on both sides are not very high, but compact and bulky; those on the left side are more considerable and steep, and the river flows along their foot; those to the right have a more gradual slope. Through the opening of a tributary from the south considerable mountains are visible in that direction. Small brooks from several springs join the Indus. The fall of the valley is very gradual. At Hlagar the height is 4 672 m, and the river had a volume of 6 cub. m a second. Between Camps 245 and 246 the rocks consist of porphyry, granophyr, porphyrite, and quartz-porphyrite. The Tibetans of Hlagar asserted the river had the same character farther downwards, there being no falls or cataracts. The following stations were given: Gyächurap, with nomads in winter; Sherdong with nomads; Pamar, with nomads; Talung-karpo and Pekiya, uninhabited; at Pekiya a small right tributary joins the Indus; a good distance below Pekiya the Lang-chu enters from the left side; there is a camping place Lang-chu or Lang at this tributary. Shibu-la is a pass somewhere near the source of Lang-chu. Takmar is a place near Pamar; Lang-chu-la is a pass somewhere between the Lang-chu and the Singi-kabab, and Pele-rakpa-la is between Lang-chu and Gar-gunsa. From Gar-gunsa to Tok-jalung is a direct road *viâ* Pamar, as follows: Pele-rakpa-la, Kaga, Gyamu, Lang-chu, Polong-nitsa, Pamar, Nabuk, Tsalam with Tsalam-la, Chatia, and Tok-jalung, here also called Shalung; there are several low, nameless passes on this road. Where the Singi-kamba joins the Gartang the height is 4 254 m, or a fall of 418 m from Hlagar, a distance of 163,6 km.

At Hlagar the road to Gartok leaves the Indus. Here two valleys from the south and S.W. join the river: Nakyu-pu and Tarruk. A little lower down the Chugung enters from the left and the Gablung from the right. All these valleys are dry. Our road goes up through the Tarruk which is full of gravel; just at the entrance of this valley rises a very abrupt porphyrite rock. Through a left tributary to the Tarruk our road ascends over soft ground to the pass Tarruki-la, 4 874 m high, where granite stands in living rock. To the S.W. appears the valley Loän-särtso, which, not far north of our road, joins the Changmar valley coming from the west, and joining the Indus from the left. So far as the Indus valley is visible it runs N. 15° W., after a short bend to the N.N.E.

The road crosses the Tok-kung, a tributary to the Loän, and then slowly ascends through the latter, which is surrounded by rounded, weathered red rocks of porphyrite, and with a bottom full of gravel. There is a spring called Loän-särtsoki-chu, whence the ground slowly rises to the little threshold Särtsoki-la, 5 028 m high. From this pass a valley goes down westwards, with a hill, Kungmo-tinge, at its right side. It was impossible to discover where this valley goes to, and my guides could give no information about it. But as Särtsoki-la, and Dotsa-la, which, with its 5 045 m, is situated at a short distance S.W. of Särtsoki-la, indicate the culmination between the Indus and the Lang-chu, the west-going valley belongs very

likely to the Lang-chu, unless there be a basin without an outlet between the two rivers. At any rate, the two passes are situated in the range which follows the left or S.W. side of the Indus, and which is the N.W. continuation of the range, in which Tseti-lachen-la is situated.

Camp 247, at a spring called Dotsa, has a height of 4 885 m. Looking S.W. and W.S.W. we have a very extensive plain stretching far away to the N.E. foot of the range, which, in this part of Tibet, is the highest of the Transhimalayan system. Between this range and the one we crossed in Särtsoki-la, and Dotsa-la, only small ridges and hills rise from the plain. Thus, on this 8th line of crossing we have found three distinct ranges, the two on both sides of the Indus, and the one between Lang-chu and Gartang; the two first mentioned are rather like swellings of the ground, and only the third, with Jukti-la, is a mighty range with eternal snow on several of its pyramidal peaks. But, of course, there are many small ranges, ridges and peaks between the three principal ranges.

A few mountains in this neighbourhood have names: Yächung is a dominating mount to the S. 79° W., and Machung another to the N. 85° W.; in the same direction, but quite near Camp 247, is Buchu; Kotsang is a comparatively large mountain to the N. 42° W., and in the same direction there is said to be a road to the upper Lang-chu; further to the right, or N.N.W. is a valley Titso said to go to the Indus. The valley of Dotsa, or Dotse-pu comes from S. 63° E.; to the S.S.W. is a valley Kunglung. The view from Dotsa, and still more from Dotsa-la, is very extensive and commands this most desolate and arid highland desert, where only the range of Jukti-la makes an imposing impression.

From Dotsa the ground gradually descends to the S.W. The country has a curious aspect: low ridges and thresholds of porphyrite stretch like fingers over the even, dark desert, resembling headlands and islands on the coast of a sea. Sugu-chu is a salt-water pool, 200 m long and 100 m broad situated at a height of 4 786 m. The dark desert stretches far to the N.W. and north. In the distance, to the north, there is a passage between hills, where a road to the Indus is said to go down. If this be true, the range along the left side of the Indus seems to be very low at the place indicated.

Some detached mountains are visible to the south; Hläri-kunglung is a dark, conical peak, and Lumbo-säju, by other informants called Lumbo-teka and Ava-latse, a red massive; the living rock is always disintegrated and weathered; the ground consists of coarse sand and fine gravel, everything is strongly denudated and levelled, and the undulations hardly noticeable to the eye. Tsorul-hle and Kung-hle are names on this dreary, waterless road. The plain itself is called Chaldi-chüldi. Uruta is a region S. 40° W. and Richü-kyangma a valley S. 22° W. The ground rises gradually to the S.W. Beyond Kung-hle the height is 4 831 m. To the right, N.W., there are detached hills, growing higher south-westwards. Camp 248, Nyanda-nakpo, is at 4 855 m. From here a road goes to Gerki, *viâ:* Loagung, Takiya-gompa, Karlung,

Mingur, Danpur, Shang, and Shingta. Straight south from Nyanda-nakpo is a nameless snowy peak; in the same direction is Yangrung a dark peak not far away. Nakyu is a valley S.S.W.; Skata is a high part of the Jukti-la range S. 40° W.; S. 72° W. there is a peak, Ale, in our neighbourhood; N. 80° W. lies Rakpe-kop also a near peak; N. 45° W. is Kul-karu a small peak; immediately N. 14° W. from the Camp is a rugged rock Satsik-nyanda-nagu; Ham-ngo is a flat, reddish mountain to the N. 32° E.; N. 69° E. is a near peak, Taldi; to the S.E. is a valley Kamsang.

From Nyanda-nakpo there is a road to the important salt lake Tsak-tsaka or Chak-tsaka, passing a valley Napipa, the pass Kyangme-la, Kyangmar, the Indus, Lungsur, the pass Chungorung-la, a place Abulung, the passes Tiba-la and Gurting-la, a place Toreng, the pass Särlung-doring, a place Changkyam, the pass Changkyam-la. Salt from Tsak-tsaka is brought on sheep to many places in Western Tibet and surrounding regions. Farther north, the places Turngo, Kalchen and Marpo-yargu, belonging to Rudok, were mentioned. There are several other places where salt is obtained in this region. One of the ordinary salt roads passes Gartok and continues to Dabadsong *viâ:* Umdung, Pachung-tena, Choko-la, obviously the same as the Shoko-la of the maps, Samda, Namra and Daba. From Nyanda-nakpo there is said to be a road north-westwards to Lapta-la, beyond which is Lapta-chu, the upper course of, or a source branch to the Lang-chu. In this connection a salt road from Hlagan to Chak-tsaka may be mentioned: Nagra-migchen, Lungchen, Nalep not far from Tok-jalung, a low pass called Rulo-la, Särlung and Chak-tsaka. From the salt lake a road goes to Gyanima, passing: Nakpo-shambo, Kyabuk, Temar, Dsojung; the pass Shaser-la, which drains into Singi-kamba and Miser-chu, Gämjung-kapkap, Dirgen-la, Gyälupung, Gombo-sumna, Gombo-la, Sonjung and Gyanima. The two last-mentioned passes are said to be low and secondary.

Continuing south-westwards our road rises gradually; several small valleys enter from the sides. Lung-karpo is a great valley directed to the N. 60° W. with an 8 days' journey to Tashi-gang. This road passes the following places: Tesär, Tongön, Karsa on the Lang-chu, Goinrung, Kyamar, Tingdum, Tak-taka and Tashi-gang. In connection with this road the following information is of interest: it is said not to cross a single pass; only low undulations; on the right, or to the N.E., it has a red range of low mountains, on the left, S.W., the high range of Jukti-la. Ladaki merchants bound for Tok-jalung, often take this road. Through the upper part of the Lung-karpo a road goes up to Jukti-changma-la or the northern Jukti pass, while my road has a more southerly course to the Jukti-hloma-la; the Jukti-changma is higher and always covered with ice, as I was told. There is a third pass, still further north, Lasar-la. The roads from all three passes join at the S.W. side of the range at Dunglung-sumdo. All three passes are said to be closed by snow in December, and remain closed for 5 months. Therefore the winter-road from Nyanda to Gar-gunsa goes down the Lang-chu, and further from Goinrung *viâ* Umlung, Pele-rakpa-la, and Dulchu to Gar-gunsa. Pele-rakpa-la is a low, soft sandy pass which never

Looking N 41° W from Gartok.

gets closed by snow. Lapta-la, farther north, gets closed; both are situated in the same range as Jukti-la.

Leaving the Lung-karpo valley to the right our road rises gradually amongst hills and gravel of porphyry, granite and dark crystalline schist, and finally reaches a little secondary threshold, 5 171 m high. Camp 249, Takto-serpo, is at a height of 5 166 m and situated on the bank of Jukti-loän-chu, which comes down from Jukti-hloma-la, and is probably one of the highest feeders of Lang-chu.

From this point the rise becomes somewhat steeper, though still slow; the valley is fairly broad, bounded by rocks of quartz-porphyry and porphyrite. In its upper part the valley opens out and receives tributaries from several sides, especially from the snow-fields and small glaciers to the south. Here alpine nature prevails, with frozen springs, moss, low grass, and Arctomys, — all a sharp contrast to the dry and desolate desert to the N.E. From a left tributary, Changsang-karpo, the rise becomes steep, and the road miserable, as it is full of blocks of all sizes. The road, if it can be called so, turns at right angles to the south, where four or five small glacier tongues hang on the steep black sides of the rocks. Finally, the road ascends to the N.W. and reaches Jukti-la, 5 825 m high, forming a wide, open convex plateau between ridges and crags.

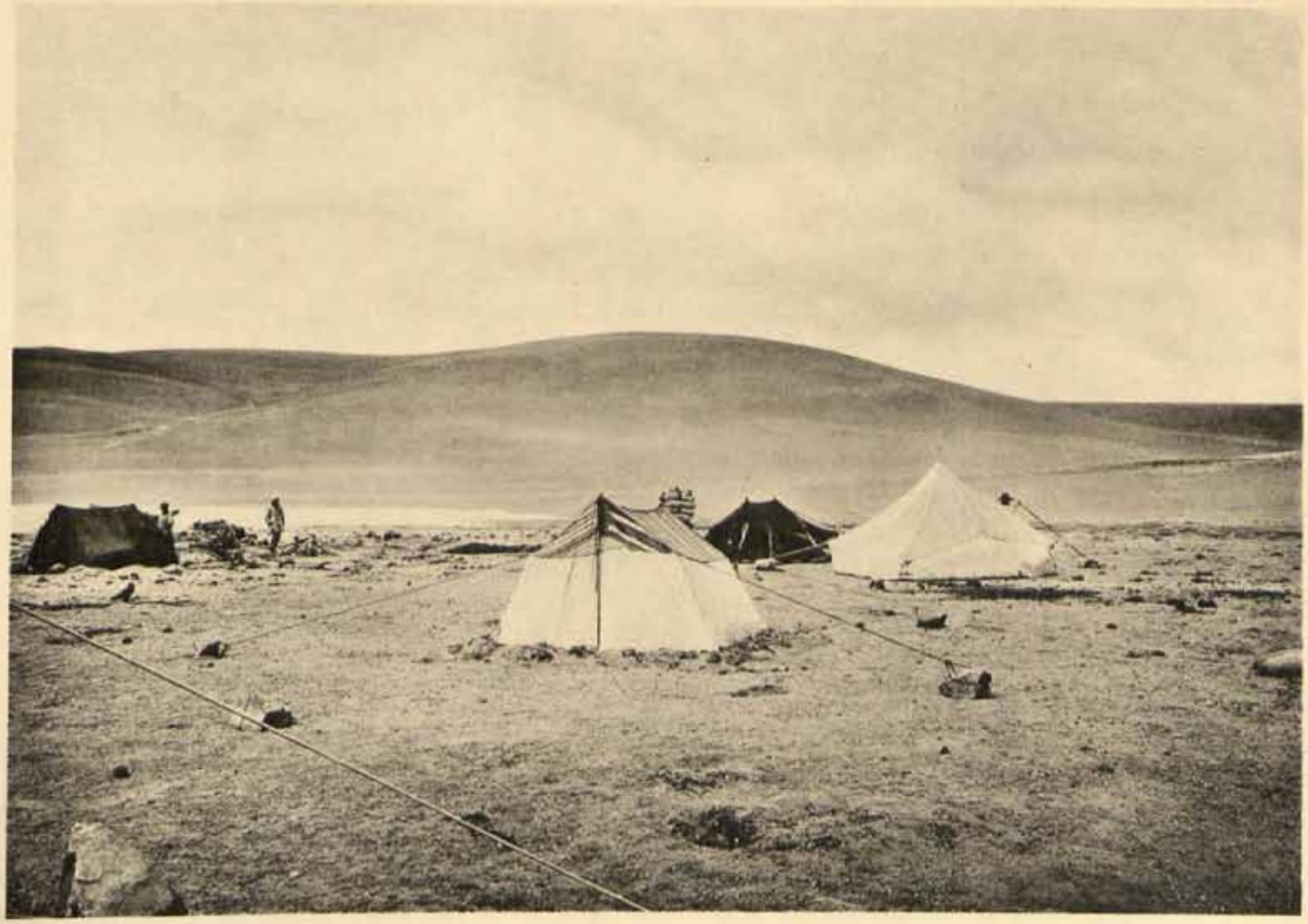
From the pass the Jukti valley descends to the west; the road from Jukti-changma-la joins our road through a little right tributary. From the left enters the tributary Dunglung-chenmo; other deep-cut gorges open on both sides; only from the Dunglung-chenmo does a brook descend, fed by the snow fields and small glaciers visible at its upper part. The bed in the main valley is some 50 m deep between sharp and steep terraces. It is a wild and deep valley between bare rocks and with a bottom full of gravel and blocks. At Dunglung-sumdo the height is 5 171 m. Here enters from the right or north the tributary Lasar with the road from Lasar-la. The rock is porphyrite, quartz-porphyrite and biotite-granite.

So far the road has followed the right side of the valley; below Camp 250, or Dunglung-sumdo, it follows the left, for here the river keeps to the right side where the rocks fall steep down to the valley. From the left enter the tributaries Taka-taso, Nima-tingting, Chogelung-ringbo and Nälung. A place where four cairns are built on the road is called Hlande-tsogra. Granite and porphyrite prevail. Where the valley opens out into the great Gartang valley the height is 4 620 m, and at Gartok it is 4 467 m.

At Hlasar some snow usually falls in winter: about 10 cm, seldom 20 cm. The Indus here is hard frozen, but there is always some running water under the ice. After strong rains the Indus may sometimes become unfordable at Hlasar.

The population is as usual very scanty. I saw only 13 tents on the banks of the Indus, and 6 at Nyanda. The animal life was the ordinary one; antelopes are not rare, and kyangs numerous, once 120 in one flock. On the Jukti-la and its sides were many Arctomys.

The *Bomba Pun* of Singtod-Singmet passes the winter at Mangla, 1½ day's journey up the Indus from Camp 246, the summer at Membup. Shachen-Shachung is a name often heard, and it seems to be a district of the *Pun* of Singtod-Singmet. Singmet is down the Indus from Camp 246, Singtod is the district where the *Bomba Pun* lives. The district between Camps 244 and 245 is Kungchen.



Hills N. E. of Ngangtse-tso.

Looking N. E. from Camp 109.

CHAPTER XXXVII.

NGANGTSE-TSO.

With our present knowledge of the Transhimalaya it is impossible to draw any absolute and definite boundaries to that system. Nobody would be able to tell where its last, easternmost ranges sink into mere hills and finally dip beneath the surface. In the far west it is very likely, though not proved beyond doubt, that the Transhimalaya belongs to the same system of crustal folds as the southern, and highest Kara-korum ranges. To the south, the upper Indus from Rupshu, the Gartang, the Manasarovar, the Gunchu-tso, the Tsangpo, at least to Latse-dsong, may be regarded as a very natural boundary line. To the north I regard the chain of great lakes, from Tengri-nor to Nganglaring-tso, as a not less natural boundary of the Central Transhimalaya, that portion of the system of which I can express an autoptic opinion, for these lakes are all situated in one great depression or latitudinal valley, and one can travel from Tengri-nor to Nganglaring-tso without crossing a single high pass. To the south of this depression is the Central Transhimalaya; to the north a system of smaller ranges, which, at the present date, is difficult to define nearer, as I have crossed it only on two lines. It has, however, to be regarded as situated between the Transhimalaya and the Tibetan Kara-korum, and could, perhaps, be called the Central Tibetan System. This system no doubt at many places stretches out apophyses both into the Kara-korum and the Transhimalaya, and is thus in direct and intimate connection with its two great neighbours. As a rule it is, of course, impossible and unnecessary to draw absolutely sharp boundary lines between the different mountain systems of Tibet.

I will now try to give a description of this depression so far as I have had an opportunity to examine it myself.

My routes in and across the depression begin at Ngangtse-tso, and proceed westwards to Nganglaring-tso. East of Ngangtse-tso I have only seen Marchar-tso from a distance. The lakes farther east, as Kyaring-tso, Mokieu-tso, Pul-tso, etc., have only been seen by Nain Sing, and are very little known. Tengri-nor or Nam-tso, at a height of 4 609 m, is the best known, as it has been visited by several

expeditions, both Pundit and European.[1] For Kyaring-tso the height of 4 502 m is given, which seems unreliable. These lakes are generally surrounded by comparatively low ranges and ridges, and only Nam-tso has very high mountains on its southern side.

I camped at 12 different places on the shores of Ngangtse-tso during the last days of December and in the beginning of January 1906—1907. The lake is at a height of 4 694 m. It is oblong, but curved as it were, turning its convexity to the north. The mountains to the south of the lake have been described in a preceding chapter. The mountains to the north are relatively low, and one has to proceed 82,5 km northwards to reach a pass (Pike-la) which is only 500 m above the level of Ngangtse-tso. To the east the country is very open, forming an extensive basin, in which Marchar-tso is situated. To the west a wide plain stretches to the foot of the hills on the eastern shore of Dangra-yum-tso.

At the northern vertex of the lake a valley, Laän, with a brook from springs, pierces a low range and opens to the undulating ground of the northern shore plain. Then follows a 4 m high rounded wall, and then a second, lower wall, both parallel with the present shore line. South of them is a long lagoon, and south of it, six more walls stretching S. 70° E.—N. 80° W.; each of them is about one metre high; a ninth shore-wall was 3 m high.

Further S.W., at Camp 100, the shore is very low and flat; near the lake it is arid, but westwards there is some good grass. To the S. 53° W. the highest peaks of the Targo-gangri are seen rising above everything else. At Camp 102 the shore slopes somewhat steeper; the beach walls are well visible; a low ridge of mountains, Lobo-samcha, rises at a short distance from the shore. Camp 101 is at an open steppe bounded to the east by low mountains. The same mountains, which are ramifications and ridges from a pyramidal though rather low peak, Dsumdi, south of the lake, reach the very shore-line of the lake at Camps 103, 99 and 104. Two headlands near Camp 103 are called Ngangpa-taktuk and Terkyn; Kuring-taknak is a headland at Camp 99. Eastwards from Camp 104 there is a narrow strip of flat land along the southern shore. At Camps 105 and 106 there is also a fairly

[1] I obtained the following information about the Nam-tso or Nam-tso-chugmo. North of it is a lake called Bong-tso. From Guring-la descends a valley, Gyadong, with Gyadong-tsangpo, to Nam-tso. Ngang-chu, Ti-chu, and Bo-chu are rivulets from the west which seem to join before entering the lake. From Guring-la and other passes, several brooks descend and join the river Reu-rong, which passes Kungdan, Dolung-deyen-dsong, Mang, Ngangtse, Chaksam and Donggar, which is half a day from Lhasa. West of Nien-chen-tang-la there are several passes near each other. There is said to be a plateau-like space between the high mountains, or a *tanga* or plain, on all sides surrounded by mountains, and from this plateau the following passes are mentioned: to the south Tsobru-la, easy; to the S.W. Tsebo-la, high; to the west Shugu-la, and to the north Guring-la. Farther east, and leading to the N.E. is Dam-largen-la. At the foot of Tsobru-la is a large monastery, Dolung-tsobru-gompa. From Tsebo-la and Shugu-la originate brooks going to the Shang valley. From Tsobru-la a brook goes to the Ki-chu of Lhasa. South of Dam-largen-la is Kangmar and the pass Dam-kenda-la. From the east the Nya-chu enters the lake. Nam-tso is said to freeze in the beginning of January and break up in the middle of May.

At Camp 107.

broad, undulating steppe between the lake and the southern foot of the northern range.

The water of Ngangtse-tso is brackish. The bottom of the lake consists of fine black clay. The lake is very shallow, its greatest depth, in the eastern half, being only 10,03 m.

The rocks at the southern shore consist of quartz-porphyry and quartz-porphyrite; at the northern shore of phyllitic schist and limestone.

Some 50 or 60 tents were said to be pitched in the valleys opening to the lake. Great flocks of sheep and yaks were seen on the western and southern shores. Some nomads at Camp 104 gave me the following geographical names: to the south is a mountain region called Dungse, probably identical with Nain Sing's Dungche-tso as an alternative name for Ngangtse-tso. Tagrak-tangu is the plain round Camp 101, taken from Tagrak-tsangpo which enters the lake in this neighbourhood. Lung-ring is a valley above Camp 103, and Sardi a valley west of it. Panglung, Mebärni, and Merik are valleys east of Camp 99. Kabrak, Nakding, Langchen, Pungumpo, Kyung, Markung-la and Laän are valleys in the northern range. Gurtsi or Gurtsin-nagyo, and Chagu-poya are mountains west of Laän. To the N. 51° W., from Camp 104, is a low part in the northern range with the pass Netong-lungpa, obviously the same as Nain Sing's Naithung Pass. To the N. 42° W. is a pyramidal snow peak. Takta-tomsing, beyond which is Ombo on the Dangra-yum-tso; N. 30° W. is Logung-napta; N. 20° W. is the peak Lamdang. To the N. 20° E., below the mouth of the valley from Markung-la, is Marku-tso, probably a salt pool, and also entered on Nain Sing's map. In the same direction is a snow peak, Potuk, and N. 40° E. another called Pu-ngumpo.

As far as I could make out, only two rivers enter the lake, namely, Tagrak-tsangpo, coming nearest from Tagrak-rung, and Ayu-tsangpo, which enters the south-western part.

CHAPTER XXXVIII.

DANGRA-YUM-TSO.

I could not approach this lake any nearer than to Camp 150, from where the lake was visible to the north. The height of the Camp was 4 708 m. Both at the Targo-tsangpo and Ngangtse-tso I was told that the Dangra-yum-tso only partly freezes, some parts of the lake remaining open the whole year round. The Ngangtse-tso on the other hand freezes thick all over, its ice being as a rule one foot thick, and even, at some places so much as 0.51 m; in spite of this difference both lakes are said to break up at about the same time, at the end of April or beginning of May.

The water of Dangra-yum-tso is said to be brackish but drinkable, and to contain fish. On the western slope of a hill straight north of Camp 150 there are very sharply marked and well preserved old beach-lines, proving a great rate of desiccation. On the road to Shuru-tso these beach-lines are visible at several places; at the eastern foot of Targo-gangri they could sometimes be followed, though not so sharply drawn as on the eastern side of the Targo valley. As a rule, the beach-lines and shore-walls are more strongly developed on the eastern shores of Tibetan salt lakes, as these shores have been more exposed to the waves driven by the prevailing west-winds. The highest beach-line on the hill north of Camp 150 was 88.95 m above the surface of the Targo-tsangpo at the foot of the hill. The height of Camp 150 above the surface of Dangra-yum-tso is unknown, but the desiccation may have proceeded about 100 m in this region.

To judge from the description I got from natives, the form Nain Sing has given the lake must be nearly or, at any rate, approximately correct, though the Pundit seems to have exaggerated its size. The nomads of Ngangtse-tso asserted their lake was greater than Dangra-yum-tso. The latter was said to be about one mile across in its centre. Following the shore on foot a pilgrim is supposed to need 5 days for performing a *kore*, or wandering round the lake. The pilgrims are accustomed to camp at the following places: the first day they go from the mouth of Targo-tsangpo to a place called Gyamar; the direction is shown as being to the S.W., indicating a S.W.—N.E. direction of the southern shore; the road goes over a plain, crossing only some hills and undulations from Targo-gangri. The second

day's road goes north and N.E. to the mouth of a valley called Tokdung; its source is said to be only one day's journey west of Dangra-yum-tso; the valley is narrow and contains running water only after rain. The valley opens to the lake where it is narrowest; the shore here is flat, and the region is called Sonyak. The third day the road goes north, turns round the northern end of the lake and proceeds S.E. to Ombo, a village of 5 or 6 stone huts, and, as some informants asserted, with some cultivation of barley. This road only crosses a few very small brooks from springs; there is a fairly broad strip of level land between the lake and the nearest mountains to the west. The fourth day's road makes a sharp turn to the east and goes on to Leden, situated opposite Tokdung at the narrow part of the lake; at the north and N.E. shore there is a plain, not very broad; but at the eastern shore down to Leden the mountains approach the very edge of the lake, and seem to fall rather steep into the Dangra-yum-tso; it is not necessary, however, to cross a single pass, the road runs quite along the water; at the middle of the eastern shore there seem to be considerable mountains. The fifth day's march returns to the starting point on the Targo-tsangpo. There are said to be no brooks, nor even any ravines on this section of the road, and the country to the east is low and level; but halfway between this lake and Ngangtse-tso there is said to be a pass, Tsug-la.

From Sabuk, Camp 154, South of Shuru-tso, a road goes northwards, which is chiefly used by salt-caravans. From Sabuk it is four days to Parung-la or Barong-la, thence two or three days to the small twin-lakes Mun-tso, and thence 6 days to Teri-nam-tso. This road leaves the Mun-tso to its right and the Teri-nam-tso to its left and continues north. Other informants told me the two Mun-tso, quite close to each other, were situated N.E. of Teri-nam-tso in a district called Namru. The distance between Dangra-yum-tso and Teri-nam-tso was said to be 5 or 6 days, which must be rather short marches. Between these two lakes there are no high mountains but only low ridges and rolling hills; but between Dangra-yum-tso and Mun-tso there is a comparatively high range crossed in a pass called Hlang-la. From Teta-la on the Teri-nam-tso one sees a world of mountains to the east, but none to be compared with the Targo-gangri.

CHAPTER XXXIX.

TERI-NAM-TSO.

In connection with the fourth crossing of the Central Transhimalaya I gave some information about Teri-nam-tso; I have now to add the description of a two days' journey along its southern shore. The lake is at a height of 4 684 m. Camp 410 from where we start westwards is at some 30 m above the surface of the lake.

From a first height in granite rock a great latitudinal valley is seen stretching N. 85° E., parallel with the eastern half of the southern shore of Teri-nam-tso, and separated from it by a rather low ridge; it seems to continue a considerable distance eastwards, and probably affords a convenient road to Dangra-yum-tso.

Continuing westwards, our road goes up to the pass Lamlung-la, 5 145 m high, of sandstone, and allowing a splendid view of the lake and the headlands of its southern shore. The broad flat valley which to such a very great extent is filled by the lake, stretches westwards as far as can be seen; over this plain the Soma-tsangpo comes down to the western end of the lake; the plain appears in light brownish, yellowish, white and gray tones, but the river is not yet visible. To the N. 26° W. rise the peaks of Shakangsham, to the N. 61° E. the island can be seen and S. 82° E. is the central peak of Targo-gangri. From here, at least, it is perfectly clear that Targo-gangri is a meridional range with a series of pyramidal peaks, all about the same height and covered with eternal snow.

On the west side of the pass the road disappears amongst blocks and gravel of granite. Camp 411 is at a place called Kibuk-hle; the region to the W.S.W. is Kechung. The district is called Lavang-nub, while Lavar-shar is from Camp 410 and eastwards. Immediately west of Camp 411 is a small lagoon separated from the lake by a neck only two feet broad, but containing perfectly fresh water. Techen is a conical hill forming a peninsula in the lake; south of it is another hill called Techung; between both there is a threshold 40 m above the lake and with rounded beach-lines at both sides. Inside the bay at the western side of these hills there is a little depression, now dry, and with a bed white with salt, as is also the case with the whole shore of the lake. The rock is sandstone. Finally the level ground between the southern range and the shore becomes broader; it is arid and white with salt. The western end of the lake has a long rounded contour-line, in the middle of which ent-

ers the Soma-tsangpo. Gyamtse and Migot are mountains at the northern shore. At Camp 412, Tertsi, a fresh-water spring comes up; a little further west opens the valley Tsalung, and beyond it is mount Tsabuk. Laronong-chung is a red mountain to the W.N.W., also belonging to the southern range.

The road to Mendong proceeds W.N.W. over the extensive plain, which is the western continuation of the bottom of Teri-nam-tso. The ground is perfectly level to the eye. The road goes near the foot of the southern mountains; from a southern valley a bed issues between erosive terraces 3 m high. There are many such valleys from both sides. At the foot of a red rock of quartz-porphyry, swampy ground surrounds some fresh-water pools called Longgyo-tso. Along the foot of the southern hills, old beach-lines are sharply developed. The ground is arid, consisting of clay and fine gravel, seldom interrupted by belts of meagre grass; a curious depression of almost white clay is passed. The monastery Mendong-gompa is situated on the left bank of the Soma-tsangpo at the foot of its erosion terrace which here is some 10 m high; the right side terrace is in two stories. The river carried (May 26th) about 11 cub. m a second. During the rainy season it cannot be crossed, especially as its bottom is quicksand. The river, which is one of the largest of the Tibetan plateau land, is here also known under the name of Nyagga-tsangpo.

The following information was given at Mendong. Tachung is a mountain to the south, and Tachen to the S.S.W.; S. 31° W. the Soma-tsangpo issues from its mountain valley; Rabalu is a dominating mountain S. 50° W.; S. 62° W. is the valley Tsong-kende; Nara is a mountain to the N. 89° W.; Nevem is a low threshold in the latitudinal valley in which the so called *serpun-lam* or gold-inspectors' road passes; further west there is said to be a higher pass, Gaktsang-la, crossed by the same road; to the N. 59° W. is visible the top of a mountain, near which the Pelung-la is situated; east of it are two other passes, Tarchok-la and Chöne-la; all these are said to belong to the range which, to the north, bounds the latitudinal valley of Teri-nam-tso; this range runs south of and parallel to the greater range, the highest peak of which is Shakangsham; north of Mendong-gompa there is said to be a latitudinal valley between these two ranges, including a lake, Dashung-tso, situated N. 46° W. from Mendong, and not larger than the Chunit-tso; it does not receive any rivers, only temporary watercourses after rain; other lakes are not to be found in the surroundings of Mendong. Yage-tarna is a mountain N. 25° W., and east of it is the valley Yage-lungpa; to the north is mount Mage; N. 12° E. is a valley Yüchen, through which a road goes to the upper Bogtsang-tsangpo; N. 39° E. is a group of red mountains, Togmar, and farther east are two low mountains, Topchen-nakta; E.N.E. are the valleys Gangni, Dorta and Tsüngen; still farther east the northern mountains disappear in the haze of the far distance; only Targo-gangri rises above everything else and is said to be seven days distant.

Mendong-gompa is at a height of 4 693 m, only a few metres above the lake. Camp 414, Sok-yung is at 4 714 m. Thus the rise is gradual and the Soma-tsangpo

has a quiet current without rapids. Its valley is open and about 4 km broad, between low mountains. The road keeps to the right side without crossing the river once. The erosion terraces are sharply developed and some 10 m high. As a rule it is easy to distinguish them from the old beach-lines, of which the highest follow the mountain sides above the sharper erosion terraces. Like the Dangra-yum-tso the Teri-nam-tso, during the pluvial period has covered an area twice or perhaps thrice as great as the present stream. At Camp 414 the highest beach-lines are quite 20 m above the bottom of the valley. The bed of the river is very broad and flat, and the river usually divided into several shallow branches. The bottom of the valley is covered with tussock grass and gravel. Just in the bend where the road turns from S.W. to south, a great latitudinal valley joins from the west; it has a road to Chok-chu, N.E. of Teri-nam-tso. The rock is quartz-porphyry. At Camp 414 a valley Sha or Ya enters from the S.E., opposite the Camp, to the N. 65° W., the mountains are called Me-ri or Men-ri; in the immediate neighbourhood, N. 12° E. is a conical rock called Nagräng.

At Camp 414 three different names were given for the river: Soma-, Nyagga-, and Soing-tsangpo. The river carried about 12 cub. m and was divided into three shallow branches. The bed was some 300 m broad and is under water after heavy rains. At the end of July the Soma-tsangpo is usually at its highest and remains high for three months, but may be crossed at some well known fords. Seven or eight km direct south from Camp 414 the valley is seen coming from the S.E. Between Camps 407 and 408 we had crossed it at a height of 4 792 m giving a fall of 108 m down to the lake. After its long run westwards the river pierces the ranges we had crossed in Dongchen-la and Teta-la. These ranges belong to the Transhimalaya and have a general direction E.S.E.—W.N.W. About their continuation, beyond the transverse valley of the Soma-tsangpo nothing is so far known with certainty; it is, however, probable that they continue with the same general direction north-westwards, where the Ladung-la may be situated in one of them. On the other hand, many of the ranges in this part of Tibet are very short and interrupted. Here is one of the places where it may be difficult to draw a sharp boundary line between the Transhimalaya and the next system to the north.

CHAPTER XL.

THE ROAD TO TAROK-TSO.

At Camp 414 my route leaves the Soma-tsangpo and proceeds W.S.W., first ascending the left side erosion terrace, which is here 8 m high and very steep; on its top there is undulating gravelly ground. Leaving the Men-ri to the right and crossing a little ramification only 4 856 m high, and an open plain where several small valleys meet, the road enters the Goa-lung which leads to Goa-la. The mountains all round look very irregular; no order prevails but it is one labyrinth of small naked rocks and hills in all directions; only to the S.E. is there a great valley that of the Soma-tsangpo. On the little threshold we find argillitic schist, and west of it, near Camp 415, quartzite, porphyrite, and diabas. To the north there is a mountain called Penlung, to the south Ri-mari. Camp 415 in the valley of Goa-lung is at a height of 5 022 m; there is a little brook from a spring and some grass; otherwise the country is very arid.

Between low mountains the road continues up the Goa-lung, to Goa-la, a flat, convenient pass covered with granitic gravel. To the S.S.E., S. and S.S.W. some parts of the Lapchung mountains are visible, but no high peaks. To the S.W., just below the pass, there is a small lake, Karong-tso, of very irregular form, and on all sides surrounded by mountains. The Goa-la, which is 5 298 m high, is probably situated in the same range as Dongchen-la and Satsot-la, and seems to become lower towards the W.N.W. North of this range is Teri-nam-tso, and south of it Karong-tso and Chunit-tso, and it is, as mentioned above, pierced by the Soma-tsangpo. West of the pass, the country is very broken, and two small thresholds have to be crossed. A valley from the north is called Karbuk; to the south are the mountains Dalang and Sumba-martsuk. Camp 416, at 5 035 m, is situated in a valley, Changsa-lungpa.

The road to Camp 417 runs straight westwards down through a broad valley with gravelly and sandy soil and some grass, and, at the foot of the southern mountains, some salt pools. Camp 417, Tamo-yakshung, is at only 4 725 m. To the N. 29° W. is a small peak not far away, and called Ra-kunsum; to the N 58° W. is Chokbe-la and N. 65° W. at some distance, a mountainous region called Lungnak. Near the camp is a pool, and the ground all round is full of shells.

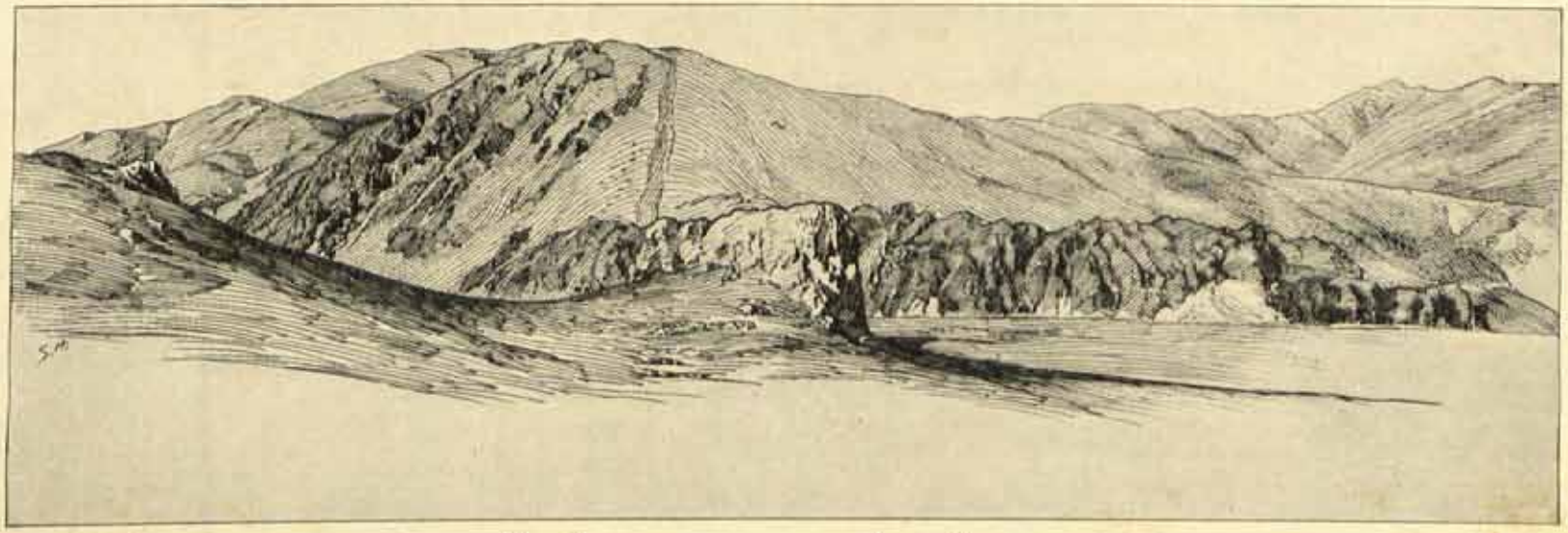
The road to Camp 418 turns south-westwards over open and convenient ground of clay and fine gravel, a broad valley surrounded by comparatively high mountains. Along their foot hills old beach-lines are clearly seen. To the N.W. is the depression of Chunit-tso, though the lake itself is not visible from this road. The slopes at the S.E. side of this valley are often very steep; some of them are called Gyunggung-nakpo and Gyunggung-karpo. Behind a headland on the N.W. side there is said to exist a depression, Nam-tso-tangi, with a little lake, Nam-tso. To the S.E. are the valleys Saglam-lungpa and Kero, and a district called Jamri. In the background, E.S.E., is a dark mountain, Nerva-tsanor. A road goes up the Saglam-valley to Lapchung, crossing two passes: the Tarag-la and the Dicha-la. The Tarag-la must be a saddle in the Lapchung range, the Dicha-la we remember as a threshold between the Lapchung range and the Kanchung-gangri. Camp 418 is at 4 786 m.

The valley continues to the S.W. and its rise is not noticeable to the eye; it is filled with swamps and freshwater pools, the abodes of many wild geese. Merke-sang is an extremely low threshold of quartz-porphyry and sandstone, and surrounded by the Gyamri mountains. It affords, however, an extensive view over the plain, which I crossed from north to south, when travelling from Chunit-tso to Buptsang-tsangpo, and which is called Merke-shung. Camp 419 at Gole-tata in the eastern part of this plain, is at a height of 4 788 m.

From here again opens the imposing view of the head-range of the Trans-himalaya to the south; S. 27° W. is a fairly isolated snowy peak, west of which there is said to be a road to Tradum; it crosses a pass, from which the valley Dsalung runs north to Buptsang-tsangpo; the name of the pass was unknown, though one would have expected Dsalung-la as the most likely. Further west, or S. 60° W., is a great valley Lungmar from Lungmar-la, said to be 2½ days distant. To the S. 80° W. is a small snowy peak, Shangjung-gangri, round which are several passages over the Transhimalaya, but no important roads. At the foot of the hills W.N.W. is a place, Merka. The mountains to the N.E. are called Gyamra-rigy; to the S. 45° E. is a low pass Chiptu-la, one day's march distant, and with a road to Bongba-kyangrang; over this pass many pilgrims from Nakchu to Kang-rinpoche are said to travel. Between S. 41° E. and S. 26° E. is a prismatic mountain called Ri-sema, and S. 13° E. is mount Serte-rigü.

At Camp 420 on the Buptsang-tsangpo, the height is 4 776 m. From Camp 419 to Camp 420 the road crosses the open perfectly level plain with hard soil, fine gravel and very little grass. Approaching the river and the western side of the plain the ground becomes undulating. The right erosion terrace of the Buptsang-tsangpo is here some 25 m high and rather steep. The river was here divided into two branches, carrying some 8 cub. m in all. From Camp 420 there is said to be a road over the right side hills to Tarok-tso, along which the grass is better than in the valley of the river.

The Indus valley and surrounding mountains as seen from the ancient castle in Leh, Ladak.



The Buptsang-tsangpo at Tuta, Camp 422.

From Camp 420 my road follows the left bank of the Buptsang-tsangpo north-westwards. On an average the valley seems to be 10 miles broad, though some passages are narrow; one of these is just below Camp 420, forming a real gorge in quartz-porphyry. Here three brooks from springs join the river, which is shut in between 20 or 25 m high erosion terraces. The narrow passage is short and the river soon comes out into the open level valley, with the Lunkar range to the left, and to the right a low range which must be the N.W. continuation of the Lapchung. This place is called Mabiya. The road is much worn by the traffic of salt caravans to and from Tabie-tsaka. The view is free and open far away to the N.W. down to the Tarok-tso. From the left side enter two valleys Nalung-lungpa and Nate, without roads to passes. The river keeps to the right side of the valley where the mountains are called Kukchung. The soil is extremely arid, and only some sparse grass is seen along the river. The region of Camp 421 is called Mabiye-tangsang-angmo, at 4 704 m. From here the Nate-valley is seen to the E.S.E; to the S. 3° W. is Nara, and Rabyi is a valley S. 22° W. In this section of the Lunkar range there are said to be no trafficable passes.

On the road to Camp 422 the valley again becomes narrower. The erosion terraces are in several stories and sharp cut, some 25 or 30 m high. At a sharp bend to the west the river sweeps the foot of the porphyry and quartz rocks. Shangchung is a tributary from the left side. At Tuta, Camp 422, the height is 4 664 m; the name of the district is Bongba-tsaruk, and a meadow at the river is known as Tsaruk-gunsa. To the west is a pass in the Lunkar range called Pechen-la. Between the Lunkar and the Kapta ranges, west of it, there must be a valley parallel to the Buptsang valley and with a threshold equivalent to the Samye-la; from the S.E. side of that threshold one of the feeders of the Tsa-chu-tsangpo must take its rise. The natives asserted that, crossing Pechen-la, one comes to a lake called Senit-tso which is of the same size as the Chunit-tso. The road to Pechen-la goes up the valley of Shangra, from which a very considerable bed comes down to the Buptsang-tsangpo, and now contained only 3/4 cub. m a second; its erosion terraces are as high as those of the main river and in three levels.

Below the mouth of the Shangra the valley becomes broader, at least 12 miles across, and widens out to a real plain with very arid soil. From here a part of the Tarok-tso is visible, as is also, to the N. 53° W., the hill of Lunkar-gompa. The mountains at the right, N.E., side of the valley are low, and pierced by very small transverse valleys. The Lunkar range, which, in this region, is the highest Trans-himalayan range, seems not to be very imposing, as its crest is hidden by lower front hills.

At Camp 423, Tarok-shung, the height is 4 632 m. A mountain to the S. 20° E. is called Malung-gangri. A brook entering the Buptsang-tsangpo near the camp, is called Malung-chu in its upper part, and Shangdok-chu lower down. To the S. 27° W. is Lungnak-gangri, and S.W. is the deep-cut valley of Lungnak. Through this valley a 7 days' road is said to go to Tuksum, crossing an easy pass called Lungnak-la.

Following the *tsalam* or salt-road north-westwards along the foot of the mountains, one crosses a little brook from a hot spring which forms a swamp to the right of the road. Buptsang-tsangpo keeps to the right side of the valley. Lunkar-gompa is situated on a hill of quartz-porphyry and quartzite, at a height of 4 756 m, and at the left side of the Lunkar valley, from which a brook goes down to the lake. As I was not allowed to approach the Tarok-tso I had to content myself with the view I could get from the hill. The westernmost part of the lake is visible to the N. 26° W. behind a projecting headland, over which the *tsalam*, or great salt road, proceeds. Some oblong lagoons are seen along the southern shore, south of this headland. I could not make out whether there is water communication between the Tarok-tso and Tabie-tsaka or not. One informant said there is a channel, and a depression, N. 2° W., is seen between the lakes. Another informant asserted there was no visible communication, though Tarok-tso is fresh. Perhaps there is a channel with intermittent flow, as from the Manasarovar. The centre of Tabie-tsaka seems to be situated directly north of the hill of Lunkar-gompa. Between both lakes is a low ridge, Elung-ri, with a pass, Gongdong-ngopta-la, west of which the channel should exist; from the pass both lakes are within sight. The distance between Lunkar-gompa and Tabie-tsaka is a three short days' march. To the N. 13° E. is a peninsula, and to the N. 21°—N. 23° E. and N. 27° E. there are two rocky islands near the northern shore, though one or both may be peninsulas. To the N. 57° E. is the easternmost visible part of the lake, which, however, may continue further east, though hidden behind a headland. The Buptsang-tsangpo, one of the greatest plateau-rivers of Tibet, empties its water into the lake. Tarok-tso is elliptical with its long axis running west and east. In the valley a little above Lunkar-gompa our Camp 424 had a height of 4 787 m.

CHAPTER XLI.

THE ROAD TO PORU-TSO.

The Lunkar valley is rather narrow and has a considerable rise; its bottom is covered with tussock grass and granite gravel; the brook follows the left hand mountains. Lunkar-la, situated in quartzite, has a height of 5 570 m. Ascending a hill close to the pass one has a beautiful view over the Tarok-tso; the mountains visible to the N.W. are Panglung-ri. To the N. 20°—26° E. the yellowish white basin of Tabie-tsaka is clearly visible beyond the very low ridge of Elung-ri; N. 26° E. the pass Gongdong-ngopta-la may be seen. The Tabie-tsaka is practically simply a bed of salt deposits, and my guide pretended it could be walked round in half a day. The salt is said to stand on a bed of clay, and only in some places does water pour up as springs. The Tarok-tso, on the other hand, looks large, even if it be an exaggeration to say that it would take four days to walk round the lake. It may be deep, as it is said to remain frozen only for two months. To the N. 49° E. the Shakangsham is clearly visible. The mountains just east of Tarok-tso are called Chokbo-ri, and to the N. 63° E. is pointed out a pass, Chokbo-la. The eastern end of Tarok-tso appears in N. 70° E., and the mouth of Buptsang-tsangpo is quite visible; to the E.N.E. is a region called Amlung, and S. 79° E. Charko-ri; S. 58° E. is a small snowy summit not far away. To the S.S.W. there are snow-covered, but not very high mountains, over which a road goes to Tuksum *viâ* a pass, Shang-la. To the S.W. a considerable range of snowy mountains is visible, obviously the Surla range.

From Lunkar-la the ground slopes down to the valley Goang-shung at 5 349 m, surrounded by black schists. Where this valley opens out to a plain the rock is again quartzite. To the west there is a low reddish ridge, beyond which a great snowy range, Surla, is sometimes visible. The road continues south-westwards over a great open plain; a valley to the right is called Longlung; a place where nomads are accustomed to pitch their tents is called Devo-utsuk. After having crossed a low threshold one reaches a considerable brook, Gyänor-tsangpo or Goang-tsangpo, coming from a red, partly snow-covered mountain, Kapta, to the S. 53° E. Here, at Camp 426, the height is 5 187 m. The river continues to the W.S.W. and empties itself into the eastern part of Poru-tso. On the sides of the surrounding mountains

are visible well marked beach lines. At the left side of the valley there is a hot spring, called Chuka-chusän. The road slowly diverges from the brook and ascends the southern hills with the little pass Chuka-la, 5 320 m. high. Just south of the pass, Camp 427, in the valley Tokya, is at 5 307 m. Quartz-porphyry and porphyrite prevail.

Along the foot of the mountains on the southern shore of Poru-tso, the road proceeds W.S.W. The beach-lines are sharp drawn the whole way, especially on the slopes exposed to the west. The valley Tavuk is crossed. At Camp 428, Shaktik, the height is 5 202 m. The rock is quartz-porphyrite. From a point a little above Camp 428, where the highest beach-line is well marked, to the shore of Poru-tso, the distance, to the N. 15° W., amounts to 1 866 m in a straight line. On this line there are 35 well preserved beach-lines. The highest is 108 m above the present surface of the lake, and is at the same time the one best developed, showing that the lake remained at that level for a comparatively long period. When standing at that level the Poru-tso may have possessed an effluent to some neighbouring depression, for not the slightest shore-lines could be seen above the 108 m beach line.

There are fish in Poru-tso, in spite of the very bad taste of the water, which is absolutely undrinkable, though there are freshwater springs along the shore. Poru-tso is a small lake of elliptical form; the long axis in N.E.—S.W. The lake is hard-frozen in winter, and short-cuts are sometimes taken over the ice, which is never ventured over the Tarok-tso. The very mighty and massive meridional range west of the lake is covered with eternal snow, and has many small glaciers. I have called it the Surla range from the name of the pass I used.

The lake is at a height of 5 094 m; it is called Poru-tso, and sometimes Yeke-tso; the name of the district is Bongba-yeke; the Surla mountains are therefore sometimes called Bongba-yeke-gangri or simply Yeke-gangri. At their eastern side, W.N.W. from Camp 428, is a valley called Nashibuk. There is said to be a direct road to Tradum from Poru-tso, crossing the pass Yor-la, which is nearer Tradum than Poru-tso; south of Yor-la is the district of Paryang. Some 3 days north is Ka-la, a pass crossed by the *serpun-lam*. Five days N.W. there is a monastery called Marmik-gompa.

From Camp 428 the road descends W.S.W. to the very broad and open valley of the brook Nyapchu-tsangpo, which comes down from Men-la, and empties itself into the Poru-tso. So far as can be seen it comes from the south and turns to the N. 20° E.; in its upper course it is called Menle-chu. Men-la is seen to the S. 5° E. and is only one day's distance from our road. June the 14 the river carried 1½ cub. m water a second, and was perfectly clear. The ground is clay deposited on the old bottom of the lake; there is some good grass. The river is broad and shallow between its low erosion terraces. West of it there is a salt-road between Hor and Tabie-tsaka, to which a march of 8 days is reckoned from here. Further W.S.W. is the entrance to the Sur-la valley where Camp 429 has a height of

5 215 m; the brook from Sur-la had, at 10 o'clock, only one cub. m a second, but, in the afternoon, 3 cub. m, at 6 o'clock 5 cub. m, and at 7 o'clock nearly 6 cub. m.

The same difficulty as usual was found in trying to obtain reliable information about the geography in the surroundings. Only the above-mentioned Men-la is visible from our road; it is a low and easy pass, between low hills. The valley of the Nyap-chu is broad and open, and slopes very gradually from the pass northwards; on the south side of Men-la a river, Nagu-tsangpo is said to take its rise. This name reminds us of Naouc Tsanpou on d'Anville's map, though the general hydrography and orography would make it more probable that the river south of Men-la belonged to the Tsa-chu-tsangpo. To the S.S.E. the passes Teblung-la and Dichok-la were mentioned; Gongchen-la is one of the passes between the districts Bongba-yeke and Bongba-paryang. On the road from Selipuk to Shamsang-tasam three passes are crossed: Gäbyi-la, Tseongding-la, and Dedo-lopchang-la; this road is situated east of my route from Selipuk to Tokchen and touches the upper reaches of Sumdan-tsangpo. West of Gäbyi-la are Yülung-la, Dopchen-la and Hle-la. To the E.S.E. is shown a road, 3 days long, to Ganglung-la and further to Tradum; Ganglung-la is said to be the same as the Goang-ding-la, and several roads join it from the north; south of the pass is Temduk-tsangpo, belonging to the Tsa-chu-tsangpo. Tag-reba-la is situated in a range or ramification between two of the feeders of Tsa-chu-tsangpo. In several cases there are secondary passes south of the main water-parting passes, as, for instance, the Lalung-la south of Men-la.

The Surla range is seen stretching northwards. In its northern part is situated the Ka-la. The natives of Poru-tso regarded the Ka-la and Men-la as situated in one and the same range, which, however, hardly can be right, for Men-la is rather a threshold between two ranges. At any rate, the northern half of the Sur-la range is meridional, while its southern half turns south-eastwards and is parallel to the Lunkar and other ranges in this region. Probably the orography is the same as we found at Samye-la, namely, that the main passes are situated in valleys, as thresholds between ranges. The general stretching of the ranges in this region is N.W—S.E. The little ridge between Tabie-tsaka and Tarok-tso, forms an exception to this rule, running west to east.

From Camp 429 it is said to be 5 days north to the *serpun-lam* or *ser-lam*, the golden road, which goes over Ka-la. Marmik-gompa is known as situated not far from Lakor-tso, which I visited in 1901.

CHAPTER XLII.

THE ROAD TO SHOVO-TSO.

From Camp 429 the road continues westwards up through the Surle valley, which is comparatively narrow, and shut in between considerable mountains. Its bottom is undulated, and covered with gravel and tussock grass. The rock is quartz-porphyrite and quartzite. From S. 57° W. enters the valley Hlolung which is greater than the Surle, and the brook of which provides about 3/4 of the volume of the joint river. The junction is called Surle-Hlolung. High mountains with eternal snow are seen at the left or northern side of the Hlolung valley. A very high mountain group with many glaciers rises between both valleys. Leaving Hlolung the road runs along the top of the Surle terrace. At Camp 430 the height is 5 525 m. Between the mountain shoulders at the northern side of the valley a glacier is seen.

The road from Camp 430 to Camp 431 is of special interest, as it crosses the Surla range, one of the highest and most massive ranges of the Central Trans-himalaya. The rise towards the pass is very steep amongst gravel and moss. The Surle-chu is fed by the brooks from three or four glaciers to the W.S.W. One of these glaciers especially, looking north, is considerable; its snout is abruptly cut, and the blue-green ice is beautifully visible; the surface is white and partly covered by moraines; in front of the snout there is a little, still frozen moraine-lake. The western neighbour of this glacier is smaller, and west of it is a road over the Tapchak-la. This pass looks rather inconvenient, and is, just like the Sur-la, secondary, for at its western side the drainage goes to the north, obviously to Pedang-tsangpo and Shovo-tso. From Tachak-la a road is said to continue westwards to Shang-la or Shangu-la, which is a first class water-parting pass, though I could not make out its situation. The nomads of this region had no other name than Gangri for these mountains, just as the Turks say Mus-tagh or the Ice mountain. They believed the Men-la, Tapchak-la and Sur-la were situated in one range, which is hardly likely.

The uppermost part of the Sur-la valley is a real basin surrounded by glaciers, *nevées*, and eternal snow. Leaving the Tapchak road to the left or west our road goes up a little side valley, full of gravel and leading to the pass generally called Sur-la, but sometimes Sur-la-Kemi-la, which is 5 832 m high. The rock is granite. Such passes as Lunkar-la, Sur-la and Ding-la, situated on the crest of ranges, are

S | S 15° W | S 31° W | S 46° W | S 60° W (ROAD TO TAPCHAK-LA)

GEN STAB LIT ANST STHLM

THE SURLA GLACIERS FROM A POINT SOUTH OF THE SUR-LA PASS.

secondary, though much higher than the first class water-parting passes, such as Surnge-la and Samye-la.

The high mountains all round do not allow of any distant view from Sur-la. At the N.W. side of the pass there is a frozen moraine pool, and here, too, some apophyses of ice reach the bottom of the valley; some very small glaciers are seen on both sides. From all of them brooks originate, gathering to a pretty large stream in the middle of the valley. The whole bottom of the upper part of this valley is full of old moraines, more or less hidden by moss. The valley gradually increases in breadth, and turns N.N.W. At Camp 431 the height is 5 443 m and the region is called Dunglung.

The valley of Dunglung-chu finally joins the Pedang-tsangpo in its very broad valley which is more like a plain. The mountains between Pedang-tsangpo and Dunglung send out a ramification, the last hills of which are crossed by our road. Where we reach the Pedang-tsangpo its terrace is 7 m high. At Camp 432 the height is 5 069 m. The river here had very little water, not even one cub. m. To the north and N.N.E. the continuation of the Surla range is visible, and it shows itself, from the west as well as from the east, to be a very sharp marked range with pyramidal peaks, great snow-fields, and many small glaciers. From this side we see that the range is meridional to the neighbourhood of Ka-la, but then slowly turns N.N.W. where it finally becomes lower and dies away. To the N. 20° E. and not far away is a comparatively high peak of this range, and south of it is a valley, Tsole-yungdokas, with a brook joining the Donglung-chu. To the S. 61° W. is a peak, and the region Pedang-pu, from which comes the greatest part of the Pedang-chu. There is also a first class water-parting pass, Pedang-la, south of which the drainage is said to go to Tuksum. Beyond Pedang-pu is Shangu-la, to the S.W. Gäbyi-la; W.S.W. is a double valley, Chima-nyung-chung, and in the same direction a more dominant snowy peak. West of the Pedang valley is a range which I have called the Pedang range. It seems to be parallel to the Surla range, that is to say, its northern part is meridional, while the southern turns south-eastwards and continues, as the Tibetans put it, some distance east of Shamsang-tasam.

The very considerable and broad valley of Pedang-tsangpo slopes gradually to the N.N.E. To begin with the soil is full of gravel, but, later on, becomes convenient and is grown over with some grass. The right side terrace is gradually transformed into a series of reddish hills; to the left no terrace is developed. Our road crosses two more watercourses joining the Pedang-tsangpo which now carries 5 cub. m. Only at one place, a little isolated hill, is living rock found, viz., granite. The ground is sometimes very swampy and crossed with great ice sheets. To the right the Surla range dominates the landscape. One of its peaks, to the N.E., is called Godang-gangri, and south of it there is a glacier, with a brook, Tsole-tsangpo, joining the Pedang-tsangpo at Camp 433; a series of other small glaciers appear in the transverse valleys of the range. From the point where our road again crosses

the Pedang-tsangpo it is said to be 3 days' journey south to Pedang-la, south of which the drainage is to Tuksum. On the road to Kailas a pass, Laptse-taruk, is mentioned, 5 days from Pedang-la, and further on comes Shangu-la. On this road the Maryum-la is left to the south.

Lower down the Pedang-tsangpo follows the left side of the valley. At Camp 433, in the district of Rusar, the height is 4 889 m. To the W.N.W. is a pass, Tolung-la, in the Pedang range. To the N.E. is Ka-la in the Sur-la range some 4 days off; north of Ka-la the range is said to be called Kotang-kang, Chungbo-kang-la, and Ganglung, which are probably all local names of valleys and mountains. There is another pass over the Sur-la range, south of Ka-la, called Kugurung-la; two days east of it the northern road to Tarok-tso and Tabie-tsaka crosses a pass called Shabrang-la which may be situated in the north-westernmost part of the Lunkar range.

From Camp 433 the road proceeds due north; its fall is extremely slow, its breadth amounts to 6 or 8 miles, and it is more like a plain. The soil is partly steppe with grass, partly clay, covered with thin pebbles. The Tsole brook turns to the N.N.E., while the Pedang-tsangpo keeps to the western or left side mountains. It is a typical meridional valley between two parallel ranges, the Surla to the east and the Pedang to the west. The latter is here rather low and crossed by a direct road to Selipuk. Further north the valley becomes more irregular and narrow, as a ramification from the western mountains stretches to the N.E.; along its southern foot the Pedang-tsangpo turns north-eastwards. The right side erosion terrace is here 5 m high; the volume of water was, at noon, $2^1/_2$ cub. m. On the left bank are some swamps and good grass. The road ascends the hills, leaving to the east the comparatively narrow passage through which the Pedang-tsangpo goes down to the lake. The pass Abuk-la in these hills has a height of 5 084 m, and presents a good view. To the N. 5° W. the Surla range seems to be interrupted, or perhaps comes to an end altogether; to the N. 5° E., N. 13° E. and N. 21° E. are snowy peaks of that range; to the N. 30° E. is shown the Ka-la saddle in the range; to the N. 37° E. and N. 47° E. are bulky mountain groups, and N. 55° E. is the pass Tokchen-la. To the east is the pass Kugurung-la. E.S.E. are some of the nearest pyramidal peaks of the range; S. 50° E. a comparatively large glacier is visible, stretching westwards from the Surla range. From Abuk-la almost the whole Shovo-tso is within sight, with its irregular shore line, its headlands and promontories; it is surrounded with old beach-lines as sharp and as high as those of Poru-tso. The view from Abuk-la is very dominating and imposing; on all sides one is surrounded by mountains, peaks, ridges, ranges, a confusion of mountains and valleys. On Abuk-la the rock consists of basalt; a second little threshold is quartz-porphyry.

The little valley going down from the pass is Abuk-lungpa; the mountains N.E. of the pass are Abuk-chungma. The valley of Pedang-tsangpo remains to the right, and the point where the river enters the lake is visible to the N.N.E.

Shovo-tso, a name which is also pronounced as Shobo, Shubo or Shuvo-tso, is a salt lake at a height of 4 784 m. On the southern shore there are fresh springs and good grass, growing on gray, soft clay. Along the shore-line there are walls of rotten algæ; like the Poru-tso the lake is oblong from S.W. to N.E. The region at the S.W. corner is called Loang-karmo.

The road proceeds north-westwards over gravelly ground and soon crosses a dry watercourse some 50 m broad and 2 m deep, carrying water only after rain; it comes from W.S.W. where its valley is called Dsom-nakpo. The road goes up through the valley Sakchu, which is broad and dry, and leads to the pass Tela-mata-la, 5 160 m high, and with a far-commanding view. Of the Surla range only the southern part, south of Kugurung-la, is within sight, with its peaks and glaciers. To the W.N.W. are the low ridges between Lavar-tsangpo and Yumba-matsen with the pass Sige-la. The snowy mountains of Lavar-gangri appear to the S. 70° W., and, north of them and their neighbours, one has a fine view of the great plain of Selipuk, which seems to stretch N.W.—S.E. parallel to the ranges. Close west of the pass is a valley Oang-tsuk, and there is a spring called Na-gyata; a valley W.N.W. is called Ganglung, Camp 435, Sermo-kunglung, is at 5 041 m.

A steep and gravelly slope takes us up to the pass Tayep-parva-la, 5 452 m high. To the S.E. one has again a fine view of the Surla range, to the N.W., and N.N.W. are the greatest parts of Nganglaring-tso; otherwise the view is hidden by neighbouring mountains. Between N.W. and north, beyond the lake, the country looks more flat and even than usual, and only N. 5° W. is there visible a little snow-field on a flat top; there are no high peaks at all in that direction as far as the eye can reach. The lake is long and stretches east and west, and its shore-line is very irregular, with peninsulas, headlands, bays and islands. Four islands can be seen, the largest of them is in the eastern part of the lake and near the southern shore.

CHAPTER XLIII.

THE ROAD TO NGANGLARING-TSO.

From the pass, which is situated in granite, the road goes steep down to the spring Tayep-parva; at 5 119 m, a brook from this spring continues to the lake. From a hill lower down, being 4 938 m high, one again has a beautiful view over the lake, which is nearly 200 m below. The mountain shoulders approaching the southern shore are quite visible, and so are all the details of the great island with its rocky ridge. To the N. 14° E., at the northern shore, is a small mountain called Shingsa, and to the N.E. a valley, Tama-mesuk; to the right of it is the region Kogle; and to the E.N.E., on the southern shore, Tayep-yogma, and due eastwards the pass Ka-la in the Surla range. To the N. 26° W. one sees a very deep bay of the lake behind a ridge.

The road then follows the southern shore of the lake nearly westwards, leaving to the south the valley, Tayep-kongma. At the foot of the southern mountains the old beach-lines are beautifully visible. The water is salt, but there are some fresh springs. The height of the lake is 4 746 m. At Camp 437 the rock is diabas.

The Pedang range comes to an end at the southern shore of Nganglaring-tso. The best road to Selipuk is undoubtedly along the shore, but keeping southwestwards across the last hills of the Pedang range, one gets an admirable view of the whole country and the lake. A little valley with a brook shows the road up to the very flat pass of Pu-karu-la, 5 287 m. high, and situated in porphyrite. In fact the pass is more like an open platform with no hindrance to the view all round. To the east and S.E. the horizon is closed by the Surla range, and to the S.W. the Lavar and Ding-la ranges rise a series of 63 snow-covered and pyramidal peaks, not very high and all of about the same height. To the S. 10° W. is shown the region where Sumdang-tsangpo has its sources, and S. 20° W. is shown the source region of Lavar-tsangpo; S. 10° W, on the Selipuk plain, is a place called Chalak. Direct west is a little lake or pool situated south of Camp 439, and called Goang-tso. To the N. 71° W. appears the western end of Nganglaring-tso. The country west of the lake is mountainous, but the western shore itself is shining white with salt and clay. N. 47° W., on the southern shore, is a headland,

Tibetans at Selipuk-gompa.

Selipuk-gompa on its terrace.

THE NGANGLARING-TSO AS SEEN FROM TAYEP-PARVA-LA.

east of which the Sumdang-tsangpo flows out into the lake. A little above its mouth the river forms some lagoons and swamps without vegetation. The Lavar-tsangpo enters the western end of the lake, behind a headland visible to the N. 67° W. Before entering the lake the river is said to join the Rataung-chu, N.W. of Selipuk; some Tibetans asserted the joint river was called Mamo-dunker-chu. To the N. 21° W. and N. 17° W. are two small flat islands, and east of them a greater island or perhaps peninsula; due north and N. 3° E. are also islands or peninsulas, all along the northern shore; still further east, in the easternmost part of the lake, is the greatest island, parallel to the southern shore. To the N. 39° E. is the last and northernmost peak on the Surla range. Camp 438, at the little spring of Pebuk, is at 4 984 m. Here the rock is limestone.

There is a good deal of sand in the mouth of the little valley going down from Pebuk, and here again we come into contact with the very sharp drawn beach-lines which are seen stretching along the foot of the hills to both sides. The lines turn beautifully round a couple of isolated hills to the north of the route and form concentric rings around the little lake at their foot. These beach-lines are in immediate connection with those mentioned from the foot of the hills south of Camp 441. Camp 439 is at the bank of Sumdang-tsangpo a few metres above the surface of Nganglaring-tso.

CHAPTER XLIV.

RÉSUMÉ OF THE NORTHERN ROAD.

The itinerary from Teri-nam-tso to Nganglaring-tso which I have described in the preceding pages does not, as might be believed at first sight, simply follow the northern edge of the Central Transhimalaya. On the contrary, it also helps us in a very essential way to clear up the complicated orography of the system. From this point of view, the northern itinerary is of incomparably higher value than the itinerary in the valley of the upper Tsangpo, which not only tells us nothing about the orographical arrangement, but rather gives us a false impression, for the innumerable buttresses and mountain shoulders, which, in reality, belong to different ranges, all seem to belong to one long range along the northern bank of the Tsangpo and Raga-tsangpo. The northern itinerary, on the other hand, crosses at least five different ranges of the Central Transhimalaya.

The most characteristic law in common for all these ranges is their stretching from N.W. to S.E. Two of them, Surla and Pedang, are even meridional in their northern parts. The Teri-nam range which was crossed in two passes and is pierced by the Soma-tsangpo, stretches W.N.W.—E.S.E. The N.W. part of the Lapchung range, which comes to an end at Tarok-tso, is a boundary, at the N.E. side, of the lower course of the Buptsang-tsangpo, while the upper course of this river is bounded by the western half of Kanchung-gangri. The high and well defined range of Lunkar, which was crossed in Lunkar-la, was determined in the whole of its course by my fifth line of crossing, along the Buptsang-tsangpo and over Samye-la; this range is in immediate connection with the Lunpo-gangri, to which belong the highest peaks of Transhimalaya, except Nien-chen-tang-la, the same which had been measured by Wood from the south. The Lunpo-gangri seems to continue in the mountains north of Saka-dsong, and then in the Chomo-uchong group and, finally, in the range situated between the Raga-tsangpo and the Tsangpo. At Ladse-dsong, this range is pierced by the Tsangpo and, further east, seems to follow the southern bank of the Tsangpo. As far as I have been able to make out, this is the only example where the Tsangpo does not form the southern boundary of the Transhimalaya, which is also in accordance with Col. Burrard's view, for the southern branch of this Kailas range is pierced by the Tsangpo.

West of the Lunkar range is the small range of Kapta, though there may be one or two more ranges near Kapta, untouched by my route. Perhaps these mountains should rather be regarded as ramifications from the great neighbouring ranges. Then follows one of the most sharply defined and highest folds of the system, the Surla range, crossed in the Sur-la, near its middle. Its western neighbour is the Pedang range. Still further west are the ranges Lavar-gangri, Ding-la and Surnge-la. There is a great gap of unknown land south of this part of my route, where everything is conjectural. But as I found all the ranges, as far as I could check them, stretching N.W.—S.E., it is very likely that this direction prevails in the unknown country as well.

In this part of Tibet there are some examples of geographical homologies. We have the Buptsang-tsangpo between two ranges and going to the Tarok-tso; we have the Nyapchu-tsangpo between two ranges and going to the Poru-tso; we have the Pedang-tsangpo between two ranges and going to the Shovo-tso. Very likely the Sumdang-tsangpo also flows between two ranges in its upper course, and finally empties itself into the Nganglaring-tso. If I may be allowed to draw preliminary conclusions from analogies, it may be presumed that the configuration between the Lunkar-Lunpo-gangri range and the Kanchung-gangri re-occurs several times further west. Thus the Nyapchu-tsangpo comes from the Men-la, which is a threshold between two ranges, just like the Samye-la, and at the S.E. side of which a river probably descends to Tsa-chu-tsangpo. The Pedang-la is probably a pass between two ranges and with a S.E.-going river belonging to the same Tsa-chu-tsangpo. Very likely the Sumdang-tsangpo and Lavar-tsangpo also come from thresholds between ranges and not from crest passes. The continental, or Indian water-parting seems, therefore, to follow the thresholds between these several folds.

Till the end of May the weather generally remained clear, but the beginning of June was sometimes very cloudy and cold; on June 3th, 4th and 6th a good deal of snow and snow hail fell, and the sky was dark with clouds. On June 12th the Gyänor-tsangpo was frozen after — 4,9° in the night. On June 18th southern wind again brought snow and hail. The prevailing wind came from S.S.W., sometimes heavy winds blew from the west. On June 19th again rain and hail. Excepting the 25th, the weather at the end of June was on the whole perfectly clear. All these dates are from 1908, which year had much more precipitation than 1907.

Animal life was abundant. Wild geese and ducks were seen, especially along the Soma-tsangpo and on the shore of Teri-nam-tso, where hares, too, lived in great numbers. Kyangs and antelopes were general along the lake, especially on the plain west of Teri-nam-tso. At Goalung kyangs, goa-antelopes and partridges were particularly numerous. On the Goa-la we saw several Pantholops antelopes. In the Buptsang valley kyangs, goa-antelopes, foxes and wild geese. In the Lunkar valley the hares were innumerable. In the high regions round Sur-la the wild yak is not rare. On the Selipuk plain there are flocks of kyangs and antelopes, and wolves are particularly numerous.

This part of the country is somewhat more populated with nomads than the interior parts of Transhimalaya. Along the southern shore of Teri-nam-tso we saw 11 tents in all, and at the lower Soma-tsangpo 6 tents. Mendong-gompa has 60 monks and 40 nuns as I was told, though this number may be exaggerated. Above the monastery, and also on the Soma river were several tents and great flocks. In Goalung, 4 tents. At and near Karong-tso, 5 tents; near Camp 418, 3 tents, and not far off several more; north of Merke-sang, 2 tents, and near Camp 420, 3; at many places on the Buptsang-tsangpo tents were seen. In the district of Tsaruk-gunsa, on the Buptsang-tsangpo, 30 tents are said to remain during the winter; in summer they are said to move over to the west side of the Lunkar range, when they use the pass af Pechen-la; 30 or 40 tents remain over winter in Bongba-kyangrang and pass the summer at Buptö, the upper part of Buptsang-tsangpo. At Camp 423, near the mouth of Buptsang-tsangpo, there were several tents. On the southern shore of Tarok-tso 2 tents could be seen. Near Lunkar-gompa were 10 tents, and several at some distance. At Camp 425 six tents were pitched; on the Gyänor-tsangpo, 2. At Camp 427 four tents, and at Camp 428 five. North of Men-la, in the valley of the Nyap-chu there are some 50 tents in all. On the Surle-tsangpo 3 tents, and on the upper course of the same river 4. Along the Pedang-tsangpo we saw 19 tents in all. To the shores of Nganglaring-tso, the nomads travel in autumn and winter.

To discover the administrative boundaries was as difficult as usual on account of the very different information one obtains from different nomads. Camp 414, on the lower Soma-tsangpo, belongs to Bongba-chushar, west of which is the district of Bongba-kyangrang; west of Goa-la is Bongba-kemar, within the boundaries of which Camps 417 and 418 were situated. S.E. of the latter camp is Bongba-kyangrang, and to the west Bongba-kebyang. Camp 422 was in the eastern part of Bongba-tsaruk, whereas the western part of the same district is said to be situated west of Pechen-la near Bongba-paryang and Hor-toshot or Toshot-horpa or Toshot. Camp 423, near the mouth of Buptsang-tsangpo, is in Tarok-shung or Gyalam-shung of Bongba-tarok, which is the district round Tarok-tso. Camp 425 is, however, said also to belong to Bongba-tarok. In this district a special tax is laid upon salt: 10 sheep-loads salt pay one *tenga* to the *Gova* of Bongba-tabie, who delivers this income to *Devashung*. Bongba-tabie is north of Tarok-tso, round Tabie-tsaka; east of it is Bongba-changma.

Camp 427, Poru-tso, is in Bongba-yeke, which is the last Bongba district to the west. Camp 428 belongs to Rigi-hloma; Rigi-changma is west of Surla. South of Men-la is a part of Bongba-paryang, and south of Bongba-paryang a part of Hor-toshot, Rigi-hloma and Rigi-changma are under the jurisdiction of the *Garpuns* of Gartok. East of Ka-la are the districts of Bongba-tabie, Bongba-changma and Bongba-parma. The lower Pedang-tsangpo is said to flow through the district of Rusar. West of the Pedang range is Rundor, which, by some informants, was

regarded as a part of Rigi-changma. Marmik-gompa is in the district of Penye, east of which are the districts of Gerke, Senkor and Gertse, — Gertse being the one furthest east.

The principal districts I heard of as being parts of the province of Bongba were: Changma, Chertam, Parma, Kyangrang, Kemar, Chushar, Paryang, Buptö, Latö, Tsaruk, Kebyang, Laktsang, Tabie, Tarok, and Yeke. The name of the province, Bongba, is always put before the name of the district, thus, for instance, Bongba-changma, or the northern Bongba.

A real net of roads crosses the province of Bongba in all directions. There are the roads used by the nomads on their yearly wanderings; the salt road, *tsa-lam*, used by the salt caravans, nearly always sheep, more seldom yaks, which radiate from Tabie-tsaka to the S.W., south and S.E. Then there are pilgrims' roads which more or less coincide with the others; further, the paths over difficult passes and arid places which are only used by robbers; finally the *ser-lam* or gold road, taken by the gold inspectors on their way from Lhasa to Tok-jalung. They travel *viâ* Guring-la, Shansa-dsong, south of Dangra-yum-tso, north of Teri-nam-tso, pass by Mendong-gompa, — thus not crossing the Soma-tsangpo, — further westwards over the Gaktsang-la, between Tarok-tso and Tabie-tsaka, over Ka-la to Selipuk, Rabdo-karpo, Yumba-matsen and Tok-jalung. From Tok they return *viâ* Lungchen, Nagra-migchen, Chu-gong, Dotsa, Jukti-la, Gartok, Parka, Tokchen and "further east" on the *tasam* or great post road. Another informant described the *serpun-lam* by the following names: Naktsang, Chokchu, Bongba-changma, Puru-namgong, Chu-naking, Ka-la, Nurkyu, Shovo-nyartsa, Rigi-changma, Raptu-garchung, Yumba-matsen and Tok-jalung, which for the greatest part of its length coincides with the first-mentioned road. This informant, however, asserted that the *Serpuns* travelled north of Tabie-tsaka, which seems more likely. Ka-la is said to be the only real pass on the road. It seems as if the *Serpuns* sometimes returned *viâ* Selipuk and Naktsong to Lhasa. Probably there are no absolute rules in this respect. But every nomad, even every child in the Central Transhimalaya, speaks of the *serpun-lam* or *ser-lam*. To get reliable information about the course of this road is not easy. Sometimes the road north of these mountains is called *chang-lam*, and the road along the Tsangpo *hlo-lam*, the northern and southern road.

A short distance east of Camp 417 my route enters an important road from Raga-tasam to Tabie-tsaka, crossing the Tsalam-nakta-la. It is chiefly used by salt caravans and joins a road from the province of Naktsang.

From Saglam, near Camp 418, a road proceeds to Dicha-la and Lapchung.

From Camp 425, S.W. of Lunkar-la, there is said to be a road to Shamsang *viâ* Ngalep, Töcha, Teblung, Karpo, Men-la-larting, Men-la-larting-do, Takdep, Hlalungla, Ronggyü-do-la, and Shamsang, in all, 10 days. From the same camp a road goes *viâ* Sang-gü, Sholo, Chuntso-lombo, Temduk, Gangchung, Yakche to Tuksum.

As a rule the itineraries given by the natives are of very little value. Even such clever and well trained men as the Pundits have no idea of physical geography, and work only as self-registering instruments, which have been prepared in India and whose records were deciphered after their return. Under such conditions one cannot expect much from Tibetan nomads. Still, if I mention two or three more itineraries, it is chiefly for the interest of the names.

A road from Mugu, near Yumba-matsen, to Gertse, is described as passing Mugu-gomo with a little pass, then Tsalam-ngopta, Nemo-chutsek, Ko-o, a valley with some water, Pushi-gunka with a pass of the same name, Pagun-dema, a spring in a mountainous region, Pagmo-chüntung, a high mountain with a brook at its foot, Keta, a camping place on the same brook, Pagmo-yüji, a plain with a well, Pakyu a spring, Tsavuk, Mentang-rigmo a spring at the foot of a mountain, Chevuk a place with bad water and no grass, Rubü-dungkyu, Shasha red mountains with salt water, which is drinkable with tea, Tägelung a high mountain with a spring, and Mense in Gertse, near a high mountain and a spring. The man who gives this itinerary has perhaps travelled the road fifty times, but it is hopeless to try and obtain any geography from him. He will tell you that marching slowly it will take you 13 days and that you will find grass at all camping places except Chevuk, but if no rain comes the grass will be bad the whole way. There are no lakes on the road, and Pushi-gunka-la, which is rather low, is the highest pass you have to cross; finally he will tell you that this is the road usually taken by the salt caravans between Gertse and Gyanima. But to get an idea of the configuration of the country would be impossible. If only there is grass and water the Tibetan will call any road splendid and forget the height of the passes.

A road from Gertse to Tradum is said to pass: Lering, Sagsong, Sagsong-la, Lema-karna, Chug-la, Dobrung-tsangpo, Chä-chära, In-koma, Tabie-tsaka, Le-kumba, Tsongchen-habuk a brook, Lunkar-gompa, Jachu-rapka, Buptö on the Buptsang-tsangpo, Bumé, Kapchuk, Jachu-kurba, Yor- or Yo-or-la, a high pass surrounded by some snow, Serak-shugong, Pon-la and Tradum; 25 days in all.

A nomad told me he had travelled from Nyuku on the *tasam* in 4 days to Chang-la-Men-la and thence in 6 days to Lunkar-gompa. But to try and discover the situation or geographical importance of this Chang-la-Men-la was hopeless, though it may have something to do with the Men-chu of Nyuku.

The following is a road from Gertse to Lhasa, where only a very few names can be identified: Shong-shinglung, Gonima-gyam, Kogen-dangpo, Tagun-dema, Pamun-keta, Ombo-tonjung, Lama-jekung, Tarap-tso, Gomon, Hotu, Lama-doma, Shaga-tübjü, Lering, Nyema-ri, Jorü-tücha, Dsam-marpo, Tsong-tong, Tong-tso, Tashin-tsobi (Tashi-bup-tso?), Rakchen, Tok-tugurakpa (Tok-daurakpa of Nain Sing?), Nali, Mamo-ogar, Mburä-karno, Mburä-namo, Gobrong-karpo, Tügü-tsangpo (= the upper course of Bogtsang-tsangpo), Yang-go-laptse, Dongchung-gompa (a monastery on a high mountain), Go-la, Saong-näja, Särka-dungchen, Agung-tso, Babu-shagrung

(a great river), Chükün-tso (Tsikut-tso), Kyäring-tsoma (Kyaring-tso), Kyäkya-rapka, Mabjän-gukchen, Mabjän-gukchung, Shansa-dsong, Tsepta-marmu, Kepa-chomden, Tari-nyasong, Hle-ngomo, Bontsema, Bo-choning, Shenker-takpa, Dam-tüshika, Tokar-jablung, Ngüring-la (Littledale's Guring-la?), Lungpe-kiba, Yompachen, Somba-ka, Lukbin-kontsi, Deching-dsong, Shing-dunga, Sera-shika, and Lhasa.

If one did not possess a general knowledge of the country traversed by this road, one would feel lost when reading these names.

When, in 1908, I was separated from half my caravan for nearly two months, I had given orders to my caravan-bashi to annotate all he could along the road he had to take and which was, partly, another than my own. We separated at the tent of Kamba Tsenam, N.E. of Saka-dsong; the first part of his road was the same as I had taken over Samye-la and along the Buptsang-tsangpo. At the lower course of this river he left the Buptsang-valley, turning north over the easy Kyangring-la, then went N.W. to Tinge near Tarok-tso. The next camp was Kurtak, which was Gova Parvang's Camp on the eastern or N.E. shore of Tarok-tso. The next camps were Kongka, Chu-nake, and Boklung, — all on the northern shore of Tarok-tso — Sermo at the western end of the lake, Tsobuk a short distance west of Lunkar-gompa, and then the same road I took over Lunkar-la, etc. But it was impossible to obtain from this man, who was a Mohamedan from Leh, whether he had seen any channel between Tarok-tso and Tabie-tsaka or any other account of the country.

I relate this to show how difficult it is to make geographical discoveries in Tibet by help of native information. One has to *see* the county oneself, and what I have seen on my travels in all directions across and along the Central Trans-himalaya, I have told in the preceding chapters. To fill in the details will be the work of future exploration.

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